Published in final edited form as:

Breast Cancer Res Treat. 2023 August ; 200(3): 347–354. doi:10.1007/s10549-023-06963-7.

Palliative care utilization and racial and ethnic disparities among women with de novo metastatic breast cancer in the United States

Fantine Giap[1], **Sung Jun Ma**[2], **Oluwadamilola T. Oladeru**[3], **Young-Rock Hong**[4], **Brian Yu**[5], **Raymond B. Mailhot Vega**[1], **Eric D. Brooks**[1], **Anurag K. Singh**[2], **Paul G. Okunieff**[1], **Nancy P. Mendenhall**[1], **Julie A. Bradley**[1]

[1]Department of Radiation Oncology, University of Florida College of Medicine, 2015 North Jefferson Street, Jacksonville, FL 32206, USA

[2]Department of Radiation Medicine, Roswell Park Comprehensive Cancer Center, Buffalo, NY, USA

[3]Department of Radiation Oncology, Mayo Clinic, Jacksonville, FL 32224, USA

[4]Department of Health Services Research, Management and Policy, University of Florida, Gainesville, FL, USA

[5]Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, The State University of New York, Buffalo, NY, USA

Abstract

Purpose—The potential disparities in palliative care delivery for underrepresented minorities with breast cancer are not well known. We sought to determine whether race and ethnicity impact the receipt of palliative care for patients with metastatic breast cancer (MBC).

Methods—We retrospectively reviewed the National Cancer Database for female patients diagnosed with stage IV breast cancer between 2010 and 2017 who received palliative care following diagnosis of MBC to assess the proportion of patients who received palliative care,

---

Julie A. Bradley jbradley@floridaproton.org.

Fantine Giap and Sung Jun Ma have contributed equally to this work.

Author contributions Study concept and design: JAB, OTO, FG, and SJM. Acquisition, analysis, or interpretation of data: JAB, OTO, FG, AKS, and SJM. Drafting of the manuscript: FG and SJM. Critical revision of the manuscript for important intellectual content: All authors. Statistical analysis: SJM. Administrative, technical, or material support: AKS, JAB, and OTO. Supervision: JAB.

Data responsibility Drs. Singh and Ma had full access to all the data in the study and took responsibility for the integrity of the data and the accuracy of the data analysis.

Competing interest Bradley—ASCO/Pfizer research grant & Florida Breast Cancer Foundation research grant; Oladeru—Bristol Myers Squibb Foundation Grant, Radiation Oncology Institute and NRG Oncology; Singh—Astra-Zeneca-National Comprehensive Cancer Network grant, Department of Defense Translational Science Grant, P30 National Cancer Institute Grant; All other authors report no conflict of interest.

Ethical approval Roswell Park Comprehensive Cancer Center institutional review board (BDR-131220) approved our study.

Disclaimer The National Cancer Database is a joint project of the Commission on Cancer of the American College of Surgeons and the American Cancer Society. The Commission on Cancer National Cancer Database and the hospitals participating in the program are the sources of the de-identified data used herein; they have not verified and are not responsible for the statistical validity of the data analysis or the conclusions derived by the authors.

including non–curative-intent local–regional or systemic therapy. Multivariable logistic regression analysis was performed to identify variables associated with receiving palliative care.

Results—60,685 patients were diagnosed with de novo MBC. Of these, only 21.4% ($n = 12{,}963$) received a palliative care service. Overall, there was a positive trend in palliative care receipt from 18.2% in 2010 to 23.0% in 2017 ($P < 0.001$), which persisted when stratified by race and ethnicity. Relative to non-Hispanic White women, Asian/Pacific Islander women (aOR 0.80, 95% CI 0.71–0.90, $P < 0.001$), Hispanic women (adjusted odds ratio [aOR] 0.69, 95% CI 0.63–0.76, $P < 0.001$), and non-Hispanic Black women (aOR 0.94, 95% CI 0.88–0.99, $P = 0.03$) were less likely to receive palliative care.

Conclusions—Fewer than 25% of women with MBC received palliative care between 2010 and 2017. While palliative care has significantly increased for all racial/ethnic groups, Hispanic White, Black, and Asian/Pacific Islander women with MBC still receive significantly less palliative care than non-Hispanic White women. Further research is needed to identify the socioeconomic and cultural barriers to palliative care utilization.

Keywords

Palliative care; Metastatic breast cancer; Health equity; Under-represented minorities

Introduction

In the US, patients with metastatic breast cancer (MBC) have a 5-year survival rate of 29% compared to 90% for all breast cancer patients [1]. The importance of palliative and supportive care interventions for improving short-term quality of life and symptom burden has been well studied in randomized trials and is supported by the American Society of Clinical Oncology (ASCO) [2-9]. The study of palliative care utilization is especially crucial for patient populations with metastatic cancer that experience worse survival outcomes. Previous studies have reported disparities in overall survival rates for underrepresented patients with MBC [10]. For example, Black women with MBC have an estimated 5-year survival rate of 26% compared to 35% to 40% for patients of all other races and ethnicities [11]. While biologic and nonbiologic factors contribute to these disparate outcomes, social and structural determinants of health are essential targets for designing and implementing health equity initiatives. Using a nationwide cancer registry, we examined racial/ethnic disparities in palliative care use during the past decade among patients with MBC to better illuminate care inequities.

Methods

To explore palliative care trends among patients with MBC in the US, we queried the National Cancer Database (NCDB). This extensive nationwide clinical oncology database captures nearly 70% of new US breast cancer diagnoses and was used to identify individuals diagnosed with de novo stage IV breast cancer between 2010 and 2017. Our study was approved by Roswell Park Comprehensive Cancer Center institutional review board (BDR-131220) and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The primary outcome was determining which patients received palliative care, defined in the NCDB as receiving a procedure to alleviate symptoms without curative intent, including surgery, radiation therapy, chemotherapy, and pain management therapy.

Variables of interest included the patient's race and ethnicity, facility type, facility volume, income, insurance, education, residential setting, diagnosis age, Charlson-Deyo comorbidity score, diagnosis year, tumor grade, clinical T and N stage, metastasis location, tumor receptor types, tumor histology, surgery types, and treatment(s) (including chemotherapy, hormone therapy, immunotherapy, and radiation therapy). Stratification was performed based on the 2016 American Community Survey data for education and income levels. We chose to use binary income and education level (below or above median) in our analysis to simplify the interpretation of the results by providing easily understandable categories that allow assessment of the impact of area-level socioeconomic status factors on palliative care service utilization and differences between race and ethnic groups. For education level, measured as the percentage of individuals who did not graduate high school, the median value of 10.9% was used for stratification. For income, the median value of $50,353 annual income based on patient zip code was used for stratification. All missing values were coded as unknown.

Baseline characteristics were compared using the chi-square test. A Cochran-Armitage test was performed to evaluate palliative care use trends from 2010 to 2017. Multivariable logistic regression was performed to identify variables associated with receiving palliative care. Multivariable Cox regression was performed to evaluate variables associated with overall survival (OS) rates, defined as the time from diagnosis to last follow-up or death. Multivariable models included all clinically relevant variables listed previously. To address immortal time bias, multivariable Cox regression was repeated among patients receiving chemotherapy with postdiagnosis survival of greater than 6 months. All P values were two-sided. Holm-Bonferroni corrections were used to adjust for three comparisons among racial and ethnic subgroups (non-Hispanic White [NHW] vs. Hispanic women [HW], NHW vs. non-Hispanic Black [NHB] women, and NHW vs. Asian or Pacific Islander [API] women). P values less than 0.05 were considered to be statistically significant. All analyses were performed using R software version 4.0.3 (R Project for Statistical Computing).

Results

A total of 60,685 women met the inclusion criteria, and 21.4% received palliative care (n = 12,963). Most patients in our study cohort were NHW women (n = 44,082), followed by NHB (n = 10,776), Hispanic (n = 3656), and API (n = 2171) women (Table 1). Each patient cohort by race and ethnicity differed significantly. Each variable was evaluated for patient demographics and tumor and treatment characteristics (Table 1).

Utilizing the Cochran Armitage test, there was an overall positive trend in palliative care receipt from 2010 (18.2%) to 2017 (23.0%) ($P < 0.001$). Stratified by race and ethnic groups, there was a similar positive trend in palliative care receipt for NHW (19.0% in 2010 to 24.2% in 2017; $P < 0.001$), Hispanic (15.0% in 2010 to 17.8% in 2017; $P = 0.04$), NHB (17.0% in 2010 to 21.7% in 2017; $P < 0.001$), and API (11.0% in 2010 to 16.4% in 2017; P

= 0.01; Fig. 1). Multivariable logistic regression confirmed this (Table 2). More recent years of diagnosis were found to be a statistically significant predictor of palliative care receipt for all patients (adjusted odds ratio [aOR] 1.04, 95% confidence interval [CI] 1.03–1.05, $P < 0.001$). Relative to NHW women, Hispanic (aOR 0.69, 95% CI 0.63–0.76, $P < 0.001$), NHB (aOR 0.94, 95% CI 0.88–0.99, $P = 0.03$), and API women (aOR 0.80, 95% CI 0.71–0.90, $P < 0.001$) were less likely to receive palliative care (Table 2).

Upon multivariable Cox regression analyses, with a median follow-up of 39.8 months (interquartile range 26.0–59.9), NHB women had significantly worse OS rates relative to NHW (adjusted hazards ratio [aHR] 1.10, 95% CI 1.07–1.13, $P < 0.001$) while Hispanic (aHR 0.79, 95% CI 0.75–0.83, $P < 0.001$) and API (aHR 0.85, 95% CI 0.79–0.91, $P < 0.001$) women had significantly improved OS rates. Among 31,767 patients receiving chemotherapy with at least 6 months of survival after diagnosis, similar findings were observed (NHB: aHR 1.15, 95% CI 1.10–1.20, $P < 0.001$; Hispanic: aHR 0.87, 95% CI 0.81–0.94, $P < 0.001$; API: aHR 0.90, 95% CI 0.81–0.99, $P = 0.03$).

Discussion

Despite a positive trend for palliative care utilization by women with de novo MBC in the US, less than 25% received palliative care with persistent disparities in palliative care for underrepresented patients. Specifically, all underrepresented patient groups received significantly less palliative care than NHW-matched counterparts from 2010 to 2017 (HW, API, Black; aOR range: 0.66–0.94). This disparity in quality care serves as a significant opportunity for future intervention.

Heterogeneity in the needs of patients with advanced cancer calls for further study of specific patient populations and the implementation of effective palliative care interventions [12]. For example, a recent retrospective cohort study reported that non-White patients with metastatic cancer were more likely to receive low-value, aggressive end-of-life interventions [13]. There is an urgent need to evaluate palliative care access for historically marginalized patients, the timing of palliative care integration into multidisciplinary oncologic care, and patient perspectives on the value of palliative care.

The increase in the utilization of palliative care between 2010 and 2017 corresponds with the timing of a 2012 update in the Commission on Cancer (COC) requirements on palliative care. The COC definition of palliative care is broad, including support for symptom management, spiritual and psychosocial needs, communication and medical decision-making, and bereavement. COC accreditation requires access to palliative care services, either on-site or by referral, as well as a minimum of two palliative care team members, including at least one physician. The guideline requires a policy and procedure outlining the available palliative care services and referral criteria [14, 15]. Support from national institutions and accreditation bodies is an important component affecting best practices, including palliative care utilization.

Our findings confirm worse mortality for Black women with MBC. Between 2010 and 2016, the survival rate for Black patients was 82% compared to 91% for White patients

[16, 17]. Notably, this disparity persists for patients with metastatic breast cancer, as Black patients have an estimated five-year survival rate of 26% compared to 35–40% for patients of all other races/ethnicities [11]. In a SEER analysis, the excess risk of breast cancer specific mortality mediated by socioeconomic factors for Black women ages 18 to 64 ranged from 51.4 to 53.6%, compared to tumor characteristics (33.9–40.7%) and metastatic pattern (3.1–15.8%) [10]. This previous research demonstrated no racial difference in breast cancer specific survival rates among patients 65 or greater. Furthermore, among women with metastatic breast cancer, non-Hispanic Black women were more likely to be uninsured, unmarried, and reside in the lowest socioeconomic status neighborhoods compared to other racial/ethnic groups [10]. Relative to all other racial/ethnic patient groups, Black women with metastatic breast cancer also had the shortest follow-up duration (mean 20.1 months, with 95% CI that did not overlap with other patient groups) [10]. Thus, while biologic and nonbiologic factors contribute to these disparate outcomes, social and structural determinants of health are important targets for designing and implementing health equity initiatives.

Study limitations include those inherent in using the NCDB as a primary data source, including lack of cancer outcomes such as local control and disease-free survival rates. In addition, it lacks details on quality of life outcomes which are vital for patients with metastatic disease. Additionally, NCDB solely includes patients treated at COC-accredited cancer programs, thus capturing only 70% of all cancer patients nationwide. Considering recent randomized studies evaluating palliative care interventions, these limitations are relevant and important areas for further research [18].

Conclusions

Our study reveals that more than 75% of women with MBC in the US do not receive palliative care services. Despite an overall increase in palliative care utilization from 2010 to 2017 and for historically marginalized patient populations, palliative care receipt disparities for racially and ethnically underrepresented groups with MBC over the past decade remain concerning. Further research is needed to identify the systemic, socioeconomic, and cultural barriers to palliative care utilization and evaluate physician bias as a mechanism for lower utilization. Such research would support early access to supportive care through healthcare institutions and patient-centered initiatives for individuals with metastatic breast cancer.

Acknowledgements

The authors wish to thank Jessica Kirwan, Amy Carrao-Tackett, and Sean Hess for editorial assistance that greatly improved the manuscript.

Funding

This research was supported by the National Cancer Institute Cancer Center Support Grant (P30CA016056). The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication; Mailhot Vega is supported by NCATS UL1TR001427 KL2 award.

Data availability

The primary data set (National Cancer Database) is available publicly for investigators associated with the Commission on Cancer-accredited programs through the American College of Surgeons (https://www.facs.org/quality-programs/cancer/ncdb).

Abbreviations

aHR	Adjusted hazards ratio
aOR	Adjusted odds ratio
API	Asian or Pacific Islander
ASCO	American society of clinical oncology
HW	Hispanic White
MBC	Metastatic breast cancer
NCDB	National cancer database
NHB	Non-Hispanic Black
NHW	Non-Hispanic White
OS	Overall survival
STROBE	Strengthening the reporting of observational studies in epidemiology
US	United States

References

1. Siegel RL, Miller KD, Fuchs HE, Jemal A (2021) Cancer statistics, 2021. CA: Cancer J Clin 71(1):7–33 [PubMed: 33433946]
2. Geels P, Eisenhauer E, Bezjak A, Zee B, Day A (2000) Palliative effect of chemotherapy: objective tumor response is associated with symptom improvement in patients with metastatic breast cancer. J Clin Oncol 18(12):2395–2405 [PubMed: 10856099]
3. Kavalieratos D, Corbelli J, Zhang D, Dionne-Odom JN, Ernecoff NC, Hanmer J et al. (2016) Association between palliative care and patient and caregiver outcomes: a systematic review and meta-analysis. JAMA 316(20):2104–2114 [PubMed: 27893131]
4. Bakitas M, Lyons KD, Hegel MT, Balan S, Brokaw FC, Seville J et al. (2009) Effects of a palliative care intervention on clinical outcomes in patients with advanced cancer: the Project ENABLE II randomized controlled trial. JAMA 302(7):741–749 [PubMed: 19690306]
5. Bakitas MA, Tosteson TD, Li Z, Lyons KD, Hull JG, Li Z et al. (2015) Early versus delayed initiation of concurrent palliative oncology care: patient outcomes in the ENABLE III randomized controlled trial. J Clin Oncol 33(13):1438–1445 [PubMed: 25800768]
6. Zimmermann C, Swami N, Krzyzanowska M, Hannon B, Leighl N, Oza A et al. (2014) Early palliative care for patients with advanced cancer: a cluster-randomised controlled trial. Lancet 383(9930):1721–1730 [PubMed: 24559581]
7. Vanbutsele G, Pardon K, Van Belle S, Surmont V, De Laat M, Colman R et al. (2018) Effect of early and systematic integration of palliative care in patients with advanced cancer: a randomised controlled trial. Lancet Oncol 19(3):394–404 [PubMed: 29402701]

8. Grudzen CR, Richardson LD, Johnson PN, Hu M, Wang B, Ortiz JM et al. (2016) Emergency department-initiated palliative care in advanced cancer: a randomized clinical trial. JAMA Oncol 2(5):591–598 [PubMed: 26768772]
9. Ferrell BR, Temel JS, Temin S, Alesi ER, Balboni TA, Basch EM et al. (2017) Integration of palliative care into standard oncology care: American society of clinical oncology clinical practice guideline update. J Clin Oncol 35(1):96–112 [PubMed: 28034065]
10. Ren JX, Gong Y, Ling H, Hu X, Shao ZM (2019) Racial/ethnic differences in the outcomes of patients with metastatic breast cancer: contributions of demographic, socioeconomic, tumor and metastatic characteristics. Breast Cancer Res Treat 173(1):225–237 [PubMed: 30293212]
11. DeSantis CE, Ma J, Goding Sauer A, Newman LA, Jemal A (2017) Breast cancer statistics, 2017, racial disparity in mortality by state. CA Cancer J Clin 67(6):439–448 [PubMed: 28972651]
12. Nickolich MS, El-Jawahri A, Temel JS, LeBlanc TW (2016) Discussing the evidence for upstream palliative care in improving outcomes in advanced cancer. Am Soc Clin Oncol Educ Book 35:e534–e538 [PubMed: 27249764]
13. Deeb S, Chino FL, Diamond LC, Tao A, Aragones A, Shahrokni A et al. (2021) Disparities in care management during terminal hospitalization among adults with metastatic cancer from 2010 to 2017. JAMA Netw Open 4(9):e2125328 [PubMed: 34550384]
14. Commision on Cancer (2023) American college of surgeons optimal resources for cancer care 2020 standards. Feb 2023, pp 1–112. https://accreditation.facs.org/accreditationdocuments/CoC/Standards/Optimal_Resources_for_Cancer_Care_Feb_2023.pdf?_gl=1*2tohlz*_ga*Mjg0ODgwOTMwLjE2ODE0MzYyOTY.*_ga_KBB21NPQBH*MTY4MTQzNjI5NS4xLjAuMTY4MTQzNjMwNS4wLjAuMA..*_ga_6C8S73MC87*MTY4MTQzNjI5NS4xLjAuMTY4MTQzNjMwNS4wLjAuMA..&_ga=2.218035606.167832602.1681436296-1355094836.1681436296. Accessed on 13 Apr 2023
15. Sheldon LK (2014) Implementing the new commission on cancer standard on palliative care services. Clin J Oncol Nurs 18(Suppl):37–38 [PubMed: 24480662]
16. American Cancer Society (2021) Cancer Facts & Figures 2021. Atlanta: American Cancer Society. https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2021/cancer-facts-and-figures-2021.pdf. Accessed on 13 Apr 2023
17. Howlader N, Noone AM, Krapcho M, Miller D, Brest A, Yu M, Ruhl J, Tatalovich Z, Mariotto A, Lewis DR, Chen HS, Feuer EJ, Cronin KA (eds) (2020) SEER cancer statistics review, 1975–2017, National Cancer Institute. Bethesda, Apr 2020. https://seer.cancer.gov/csr/1975_2017/, based on November 2019 SEER data submission, posted to the SEER web site. Accessed on 13 Apr 2023
18. Greer JA, Moy B, El-Jawahri A, Jackson VA, Kamdar M, Jacobsen J et al. (2022) Randomized trial of a palliative care intervention to improve end-of-life care discussions in patients with metastatic breast cancer. J Natl Compr Canc Netw 20(2):136–143 [PubMed: 35130492]

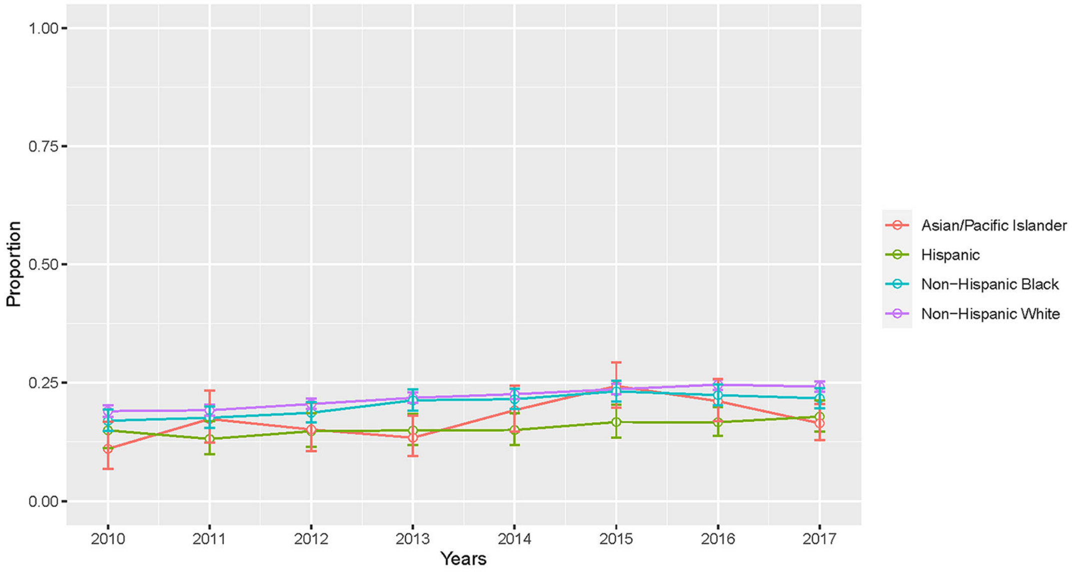

Fig. 1.

Overall trends in palliative care utilization by race and ethnicity

Table 1

Patient demographic, tumor, and treatment characteristics ($N = 60{,}685$)

Variable	Racial/ethnic groups (number of patients, percentages)				*P* value
	NHW (*N* = 44,082)	Hispanic (*N* = 3656)	NHB (*N* = 10,776)	API (*N* = 2171)	
Palliative care					< 0.001
No	34,305 (77.8)	3083 (84.3)	8551 (79.4)	1783 (82.1)	
Yes	9777 (22.2)	573 (15.7)	2225 (20.6)	388 (17.9)	
Chemotherapy					< 0.001
No	18,607 (42.2)	1192 (32.6)	3805 (35.3)	762 (35.1)	
Yes	24,653 (55.9)	2358 (64.5)	6733 (62.5)	1355 (62.4)	
Not available	822 (1.9)	106 (2.9)	238 (2.2)	54 (2.5)	
Endocrine therapy					< 0.001
No	17,214 (39.0)	1742 (47.6)	5547 (51.5)	953 (43.9)	
Yes	25,712 (58.3)	1798 (49.2)	4852 (45.0)	1142 (2.6)	
No available	1156 (2.6)	116 (3.2)	377 (3.5)	76 (3.5)	
Immunotherapy					< 0.001
No	39,073 (88.6)	3140 (85.9)	9519 (8.3)	1818 (83.7)	
Yes	4854 (11.0)	501 (13.7)	1209 (11.2)	339 (15.6)	
Not available	155 (0.4)	15 (0.4)	48 (0.4)	14 (0.6)	
Radiation therapy					< 0.001
No	28,210 (64.0)	2320 (63.5)	7107 (66.0)	1370 (63.1)	
Yes	14,480 (32.8)	1172 (32.1)	3292 (30.5)	727 (33.5)	
Not available	1392 (3.2)	164 (4.5)	377 (3.5)	74 (3.4)	
Surgery					< 0.001
None	32,577 (73.9)	2627 (71.9)	8186 (76.0)	1546 (71.2)	
Lumpectomy	3268 (7.4)	264 (7.2)	685 (6.4)	143 (6.6)	
Mastectomy	8021 (18.2)	737 (20.2)	1844 (17.1)	466 (21.5)	
Other	53 (0.1)	2 (0.1)	12 (0.1)	6 (0.3)	
Not available	163 (0.4)	26 (0.7)	49 (0.5)	10 (0.5)	
Facility					< 0.001
Nonacademic	28,969 (65.7)	1734 (47.4)	5560 (51.6)	1089 (50.2)	

Variable	**Racial/ethnic groups (number of patients, percentages)**				***P* value**
	NHW (*N* = 44,082)	**Hispanic (*N* = 3656)**	**NHB (*N* = 10,776)**	**API (*N* = 2171)**	
Academic	12,815 (29.1)	1444 (39.5)	4263 (39.6)	856 (39.4)	
Not available	2298 (5.2)	478 (13.1)	953 (8.8)	226 (10.4)	
Facility volume					< 0.001
Low	4668 (10.6)	227 (6.2)	629 (5.8)	185 (8.5)	
Intermediate	11,178 (25.4)	851 (23.3)	227 (20.7)	480 (22.1)	
High	28,236 (64.1)	2578 (70.5)	7920 (73.5)	1506 (69.4)	
Age					< 0.001
< 50	7247 (16.4)	1228 (33.6)	2705 (25.1)	631 (29.1)	
50–70	22,935 (52.0)	1746 (47.8)	5761 (53.5)	1119 (51.5)	
> 70	13,900 (31.5)	682 (18.7)	2310 (21.4)	421 (19.4)	
Charlson-Devo Score					< 0.001
0	35,870 (81.4)	3041 (83.2)	8348 (77.5)	1811 (83.4)	
1	5768 (13.1)	473 (12.9)	1653 (15.3)	266 (12.3)	
≥ 2	2444 (5.5)	142 (3.9)	775 (7.2)	94 (4.3)	
Year of diagnosis					< 0.001
2010–2013	19,843 (45.0)	1597 (43.7)	4902 (45.5)	842 (38.8)	
2014–2017	24,239 (55.0)	2059 (56.3)	5874 (54.5)	1329 (61.2)	
Histology					< 0.001
Ductal or lobular	34,907 (79.2)	2908 (79.5)	8729 (81.0)	1786 (82.3)	
Others	9175 (20.8)	748 (20.5)	2047 (19.0)	385 (17.7)	
Grade					< 0.001
Well diff	3065 (7.0)	174 (4.8)	487 (4.5)	107 (4.9)	
Moderately diff	15,760 (35.8)	1181 (32.3)	3157 (29.3)	721 (33.2)	
Poorly diff	15,817 (35.9)	1478 (40.4)	5097 (47.3)	922 (42.5)	
Other	179 (0.4)	26 (0.7)	33 (0.3)	14 (0.6)	
Not available	9261 (21.0)	797 (21.8)	2002 (18.6)	407 (18.7)	
cT					< 0.001
1	6959 (15.8)	454 (12.4)	1282 (11.9)	226 (10.4)	
2	12,613 (28.6)	957 (26.2)	2657 (24.7)	595 (27.4)	
3	5823 (13.2)	585 (16.0)	1665 (15.5)	357 (16.4)	

Variable	Racial/ethnic groups (number of patients, percentages)				*P* value
	NHW (*N* = 44,082)	Hispanic (*N* = 3656)	NHB (*N* = 10,776)	API (*N* = 2171)	
4	12,808 (29.1)	1080 (29.5)	3840 (35.6)	738 (34.0)	
Not available	5879 (13.3)	580 (15.9)	1332 (12.4)	255 (11.7)	
cN					< 0.001
0	11,413 (25.9)	735 (20.1)	1997 (18.5)	413 (19.0)	
1	17,781 (40.3)	1571 (43.0)	4534 (42.1)	925 (42.6)	
2	4589 (10.4)	392 (10.7)	1375 (12.8)	235 (10.8)	
3	5248 (11.9)	522 (14.3)	1714 (15.9)	378 (17.4)	
Not available	5051 (11.5)	436 (11.9)	1156 (10.7)	220 (10.1)	
Tumor receptor					< 0.001
HR+/HER2−	27,806 (63.1)	2035 (55.7)	5675 (52.7)	1253 (57.7)	
HR−/HER2+	3744 (8.5)	440 (12.0)	1073 (10.0)	271 (12.5)	
HR+/HER2+	6975 (15.8)	636 (17.4)	1691 (15.7)	397 (18.3)	
HR−/HER2−	5557 (12.6)	545 (14.9)	2337 (21.7)	250 (11.5)	
Metastasis to bone					< 0.001
No	13,500 (30.6)	1249 (34.2)	3994 (37.1)	764 (35.2)	
Yes	30,227 (68.6)	2376 (65.0)	6705 (62.2)	1384 (63.7)	
Not available	355 (0.8)	31 (0.8)	77 (0.7)	23 (1.1)	
Metastasis to brain					< 0.001
No	40,031 (90.8)	3253 (89.0)	9745 (90.4)	1996 (91.6)	
Yes	3342 (7.6)	332 (9.1)	889 (8.2)	148 (6.8)	
Not available	709 (1.6)	71 (1.9)	142 (1.3)	27 (1.2)	
Metastasis to liver					< 0.001
No	32,766 (74.3)	2790 (76.3)	7744 (71.9)	1597 (73.6)	
Yes	10,674 (24.2)	805 (22.0)	2900 (26.9)	546 (25.1)	
Not available	642 (1.5)	61 (1.7)	132 (1.2)	28 (1.3)	
Metastasis to lungs					< 0.001
No	30,649 (69.5)	2455 (67.1)	6920 (64.2)	1419 (65.4)	
Yes	12,608 (28.6)	1128 (30.9)	3695 (34.3)	715 (32.9)	
Not available	825 (1.9)	73 (2.0)	161 (1.5)	37 (1.7)	
Education					< 0.001

Variable	**Racial/ethnic groups (number of patients, percentages)**				***P* value**
	NHW (*N* = 44,082)	**Hispanic (*N* = 3656)**	**NHB (*N* = 10,776)**	**API (*N* = 2171)**	
Above median	23,353 (53.0)	838 (22.9)	2715 (25.2)	1015 (46.8)	
Below median	16,651 (37.8)	2524 (69.0)	7099 (65.9)	974 (44.9)	
Not available	4078 (9.3)	294 (8.0)	962 (8.9)	182 (8.4)	
Income					< 0.001
Above median	25,458 (57.8)	1671 (45.7)	3308 (30.7)	1501 (69.1)	
Below median	14,459 (32.8)	1686 (46.1)	6497 (60.3)	486 (22.4)	
Not available	4165 (9.4)	299 (8.2)	971 (9.0)	184 (8.5)	
Insurance					< 0.001
None	1577 (3.6)	541 (14.8)	859 (8.0)	152 (7.0)	
Private	18,594 (42.2)	1179 (32.2)	3776 (35.0)	990 (45.6)	
Government	23,366 (53.2)	1860 (50.9)	5971 (55.4)	998 (46.0)	
Not available	545 (1.2)	76 (2.1)	170 (1.6)	31 (1.4)	
Residence					< 0.001
Metropolitan	36,193 (82.1)	3465 (94.5)	9716 (90.2)	2007 (92.4)	
Urban	5925 (13.4)	136 (3.7)	740 (6.9)	98 (4.5)	
Rural	755 (1.7)	9 (0.2)	105 (1.0)	16 (0.7)	
Not available	1209 (2.7)	55 (1.5)	215 (2.0)	50 (2.3)	

N number, *NHW* non-Hispanic White, *NHB* non-Hispanic Black, *API* Asian/Pacific Islander, *diff* differentiated, *cT* tumor grade, *cN* node, *HR* hormone-receptor, *HER2* human epidermal growth factor receptor 2

Table 2

Logistic multivariable analysis of palliative care receipt

Variable	**aOR**	**95% CI**	***P* value**
Race			
NHW	Reference		
Hispanic	0.69	0.63–0.76	< 0.001
NHB	0.94	0.88–0.99	0.03
API	0.8	0.71–0.90	< 0.001
Chemotherapy			
No	Reference		
Yes	0.93	0.88–0.97	0.002
Endocrine therapy			
No	Reference		
Yes	1.16	1.10–1.23	< 0.001
Immunotherapy			
No	Reference		
Yes	1.10	1.02–1.18	0.01
Radiation therapy			
No	Reference		
Yes	3.91	3.74–4.09	< 0.001
Surgery			
None	Reference		
Lumpectomy	0.40	0.36–0.44	< 0.001
Mastectomy	0.36	0.33–0.38	< 0.001
Other	0.52	0.26–0.96	0.05
Facility			
Nonacademic	Reference		
Academic	0.88	0.84–0.93	< 0.001
Facility volume			
Low	Reference		
Intermediate	1.02	0.94–1.11	0.65
High		1.05–1.22	0.002
Age			
< 50	Reference		
50–70	1.07	1.01–1.15	0.03
> 70	0.98	0.90–1.06	0.61
Charlson-Deyo Score			
0	Reference		
1	1.11	1.05–1.18	< 0.001
≥ 2	1.27	1.17–1.39	< 0.001

Variable	**aOR**	**95% CI**	***P* value**
Year of diagnosis			
Per year increase	1.04	1.03–1.05	< 0.001
Histology			
Ductal or lobular	Reference		
Other	0.99	0.94–1.05	0.74
Grade			
Well diff	Reference		
Moderately diff	0.99	0.91–1.09	0.88
Poorly diff	1.03	0.94–1.12	0.59
Other	0.76	0.52–1.08	0.14
cT			
1	Reference		
2	1.04	0.97–1.11	0.31
3	1.04	0.96–1.13	0.29
4	1.15	1.07–1.23	< 0.001
cN			
0	Reference		
1	0.95	0.90–1.01	0.08
2	1.00	0.92–1.08	0.96
3	0.98	0.90–1.05	0.51
Tumor receptor			
HR+/HER2−	Reference		
HR−/HER2+	1.01	0.92–1.11	0.81
HR+/HER2+	0.93	0.87–1.00	0.04
HR−/HER2−	1.22	1.13–1.32	< 0.001
Metastatic to bone			
No	Reference		
Yes	1.84	1.75–1.94	< 0.001
Metastatic to brain			
No	Reference		
Yes	1.04	0.97–1.12	0.27
Metastatic to liver			
No	Reference		
Yes	1.19	1.13–1.25	< 0.001
Metastatic to lungs			
No	Reference		
Yes	1.18	1.12–1.23	< 0.001
Education			
Above median	Reference		

Variable	**aOR**	**95% CI**	***P* value**
Below median	0.93	0.88–0.98	0.004
Income			
Above median	Reference		
Below median	1.1	1.04–1.16	< 0.001
Insurance			
None	Reference		
Private	0.91	0.83–1.00	0.06
Government	0.96	0.87–1.06	0.43
Residence			
Metropolitan	Reference		
Urban	1.16	1.09–1.24	< 0.001
Rural	1.14	0.96–1.34	0.13

aOR adjusted odds ratio, *CI* confidence interval, *NHW* non-Hispanic White, *NHB* non-Hispanic Black, *API* Asian/Pacific Islander, *diff* differentiated, *cT* tumor grade, *cN* node, *HR* hormone-receptor, *HER2* human epidermal growth factor receptor 2