

MIT Open Access Articles

Disparities in Breast-Conserving Therapy Versus Mastectomy Among Asian American and Pacific Islander Women

The MIT Faculty has made this article openly available. **Please share** how this access benefits you. Your story matters.

Citation: Patel, Tej A., Dee, Edward C., Jain, Bhav, Vapiwala, Neha, Santos, Patricia M. G. et al. 2023. "Disparities in Breast-Conserving Therapy Versus Mastectomy Among Asian American and Pacific Islander Women."

As Published: <https://doi.org/10.1245/s10434-023-13315-8>

Publisher: Springer International Publishing

Persistent URL: <https://hdl.handle.net/1721.1/150887>

Version: Author's final manuscript: final author's manuscript post peer review, without publisher's formatting or copy editing

Terms of Use: Article is made available in accordance with the publisher's policy and may be subject to US copyright law. Please refer to the publisher's site for terms of use.



Disparities in Breast-Conserving Therapy Versus Mastectomy Among Asian American and Pacific Islander Women

This Accepted Manuscript (AM) is a PDF file of the manuscript accepted for publication after peer review, when applicable, but does not reflect post-acceptance improvements, or any corrections. Use of this AM is subject to the publisher's embargo period and AM terms of use. Under no circumstances may this AM be shared or distributed under a Creative Commons or other form of open access license, nor may it be reformatted or enhanced, whether by the Author or third parties. By using this AM (for example, by accessing or downloading) you agree to abide by Springer Nature's terms of use for AM versions of subscription articles: <https://www.springernature.com/gp/open-research/policies/accepted-manuscript-terms>

The Version of Record (VOR) of this article, as published and maintained by the publisher, is available online at: <https://doi.org/10.1245/s10434-023-13315-8>. The VOR is the version of the article after copy-editing and typesetting, and connected to open research data, open protocols, and open code where available. Any supplementary information can be found on the journal website, connected to the VOR.

For research integrity purposes it is best practice to cite the published Version of Record (VOR), where available (for example, see ICMJE's guidelines on overlapping publications). Where users do not have access to the VOR, any citation must clearly indicate that the reference is to an Accepted Manuscript (AM) version.

TITLE

Disparities in Breast-Conserving Therapy Versus Mastectomy Among Asian American and Pacific Islander Women

RUNNING TITLE

Racial Disparities in BCT Versus Mastectomy

AUTHORS

Tej A. Patel¹; Edward Christopher Dee, MD²; Bhav Jain, BS³; Neha Vapiwala, MD⁴; Patricia Mae G. Santos, MD, MS^{2*}; Oluwadamilola M. Fayanju, MD, MA, MPH^{5*}

INSTITUTION

¹ *University of Pennsylvania, Philadelphia, PA*

² *Department of Radiation Oncology, Memorial Sloan Kettering Cancer Center, New York, NY*

³ *Massachusetts Institute of Technology, Cambridge, MA*

⁴ *Department of Radiation Oncology, University of Pennsylvania, Philadelphia, PA*

⁵ *Department of Surgery, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA*

**Drs. Santos and Fayanju contributed equally as principle investigators (PIs).*

CORRESPONDING AUTHORS (*)

Patricia Mae Garcia Santos, MD, MS

Department of Radiation Oncology

Memorial Sloan Kettering Cancer Center

New York, NY 10065

Email: santosp@mskcc.org

Oluwadamilola “Lola” Fayanju, MD, MA, MPH

Department of Surgery

University of Pennsylvania

3400 Spruce Street, Silverstein 4, Philadelphia, PA 19104

Email: fyanju@upenn.edu

Phone: 215-662-4392

Fax: 215-662-7476

KEY WORDS: Breast cancer; lumpectomy; external beam radiation therapy; breast radiotherapy; mastectomy; breast surgery

WORD COUNT: 724 Words, 1 Figure, 1 Table; **REFERENCES:** 6.

AUTHOR DISCLOSURES: None.

FUNDING: ECD and PMGS are funded in part through the Cancer Center Support Grant from the National Cancer Institute (P30 CA008748). OMF is supported by the National Institutes of Health (NIH) under Award Number 7K08CA241390-03 (PI: Fayanju). The content of this manuscript is solely the responsibility of the authors and does not necessarily represent the official views of the NIH.

DATA SHARING STATEMENT: Research data from the National Cancer Database are available upon request from the American Cancer Society and the American College of Surgeons (<http://ncdbpuf.facs.org/>).

SYNOPSIS

We analyzed rates of breast-conserving therapy (BCT) and mastectomy among women with cT1-2N0M0 breast cancer using the National Cancer Database. Women from several AANHPI groups were more likely to receive mastectomy compared to Non-Hispanic White women, emphasizing a need to overcome racial barriers underlying treatment utilization.

INTRODUCTION

Recent population-based studies have shown that breast-conserving therapy (BCT), defined as partial mastectomy (i.e., lumpectomy) followed by adjuvant radiotherapy, may be associated with improved outcomes compared with mastectomy among patients with early-stage (T1-2N0) breast cancer.¹ Among Asian American, Native Hawaiian, and Pacific Islander (AANHPI) patients in the United States, many women continue to undergo mastectomy and experience barriers to receipt of BCT including a lack of awareness regarding the oncologic safety of BCT, potential clinical ineligibility, distance to radiation treatment facilities, and clinician bias in treatment recommendations and counseling.¹⁻³ In this study, we examined BCT utilization by disaggregated AANHPI subpopulations (i.e., ethnicity or country of origin) to identify differences in receipt of mastectomy versus BCT.

METHODS

The 2004-2017 National Cancer Database (NCDB) was queried to identify women age ≥ 18 years old diagnosed with cT1-2N0M0 breast cancer treated with either BCT or mastectomy without post-mastectomy radiation therapy (PMRT). Women with missing clinical or race/ethnicity data were excluded. Women were classified based on self-reported race, i.e., Asian, Black, White, and American Indian, Aleutian, or Eskimo patients. Women who identified as Asian were further classified by ethnic subpopulation, including Indian or Pakistani, Chinese, Filipino, Hawaiian, Hmong, Japanese, Kampuchean, Korean, Laotian, Pacific Islander, Pakistani, Thai, and Vietnamese (see **Methods** in Supplemental Materials).

Multivariable logistic regression defined adjusted odds ratios (ORs) assessing the association between race and the receipt of BCT versus mastectomy for all patients and separately by cT1-2 stage. White race was used as the referent given the large sample size. All models were adjusted for relevant sociodemographic and clinical factors, including combined receptor status (ER-/PR-/HER-, HER2+, HR+/HER2-) and clinical stage (cT1 vs. cT2, **See Appendix**). Significance was set at $p<0.05$. All analyses were performed with Stata/SE, version 17.0 (StataCorp LLC). Given the use of de-identified and publicly available data, this study was deemed exempt from IRB approval.

RESULTS

The analytic cohort was composed of 794,403 women with cT1-2N0M0 breast cancer. Of the women identified, 239,801 (30.2%) received mastectomy and 554,602 (69.8%) received BCT. Of the women that received mastectomy, 7,245 (35.9%) were AANHPI, 211,126 (30.2%) were White, and 20,780 (28.5%) were Black. Of the women that received BCT, 12,916 (64.1%) were AANHPI, 488,034 (69.8%) were White, and 52,217 (71.5%) were Black (**Figure 1**).

After adjusting for clinical and sociodemographic factors, AANHPI women had greater odds of receiving mastectomy over BCT, compared to White women (OR 1.35, 95% CI: 1.30—1.39, $p<0.001$). In contrast, Black women were less likely than White women to receive mastectomy (OR 0.86, 95% CI: 0.84—0.87, $p<0.001$). Upon disaggregation, Chinese, Japanese, Filipino, Korean, Vietnamese, and Asian Indian & Pakistani women were more likely to receive mastectomy over BCT compared to White women ($p<0.001$ for all, **Table 1**). Treatment at comprehensive community cancer centers, academic/research centers, and integrated cancer centers were all associated with greater odds of mastectomy compared to treatment at community cancer programs. Greater distance from treatment facility and cT2 disease were also associated with greater odds of receiving a mastectomy (**Table 1**). These disparities largely persisted in sensitivity analyses stratified by cT1-2 stage.

DISCUSSION

In this large, retrospective cohort study of women with early-stage breast cancer, women from several AANHPI groups were more likely to receive mastectomy (as opposed to BCT) compared to White women, and we confirmed an association between lower BCT rates and greater travel distance to treating facilities.² While cultural preferences, differential interest in and access to reconstruction, as well as prevalent tumor-to-breast ratios may partially explain the disparities, more focus needs to be placed on addressing patient involvement in surgical-decision making, tailoring public health education and community outreach to vulnerable populations, and improving racial concordance and cultural humility among healthcare providers and the facilities in which they practice.³⁻⁶

Due to the retrospective nature of this study, our findings are subject to potential misclassification and selection bias. Additionally, the NCDB lacks details regarding individual ineligibility for BCT or body mass index or tumor to breast ratios. However, our analysis controlled for biased comparisons by excluding patients who may have absolute contraindications to BCT, including those with inflammatory disease. Lastly, there is also limited data available regarding Pacific Islander subpopulations, who may be at higher risk of more advanced disease. Further research is needed to understand the complex factors underlying patient preference regarding BCT versus mastectomy among women with early-stage breast cancer to mitigate disparities.

REFERENCES

1. Agarwal S, Pappas L, Neumayer L, Kokeny K, Agarwal J. Effect of Breast Conservation Therapy vs Mastectomy on Disease-Specific Survival for Early-Stage Breast Cancer. *JAMA Surgery*. 2014;149(3):267-274. doi:10.1001/JAMASURG.2013.3049
2. Voti L, Richardson LC, Reis IM, Fleming LE, MacKinnon J, Coebergh JWW. Treatment of local breast carcinoma in Florida: the role of the distance to radiation therapy facilities. *Cancer*. 2006;106(1):201-207. doi:10.1002/CNCR.21557
3. Katz SJ, Lantz PM, Janz NK, et al. Patient involvement in surgery treatment decisions for breast cancer. *Journal of Clinical Oncology*. 2005;23(24):5526-5533. doi:10.1200/JCO.2005.06.217
4. Yu AYL, Thomas SM, DiLalla GD, et al. Disease characteristics and mortality among Asian women with breast cancer. *Cancer*. 2022;128(5):1024-1037. doi:10.1002/CNCR.34015
5. Hawley ST, Griggs JJ, Hamilton AS, et al. Decision Involvement and Receipt of Mastectomy Among Racially and Ethnically Diverse Breast Cancer Patients. *JNCI Journal of the National Cancer Institute*. 2009;101(19):1337. doi:10.1093/JNCI/DJP271
6. Faermann R, Sperber F, Schneebaum S, Barsuk D. Tumor-to-breast volume ratio as measured on MRI: a possible predictor of breast-conserving surgery versus mastectomy. *The Israel Medical Association Journal*. 2014;16(2):101-105.

FIGURE & TABLE LEGENDS

Figure 1: Proportion of Women with cT1-2N0M0 Breast Cancer Status Post Mastectomy vs Breast-Conserving Therapy, Stratified by Race, National Cancer Database, 2004-2017.

Table 1: Association between Sociodemographic Characteristics and Receipt of Mastectomy vs Breast-Conserving Therapy for Women with cT1-2N0M0 breast cancer, National Cancer Database, 2004-2017.^{a,}

^b

^aThree separate models are represented, each containing a dependent variable that represents receipt of mastectomy over BCT. The analytic cohort includes women in the National Cancer Database diagnosed with cT1-2N0M0 breast cancer from January 1, 2004, to December 31, 2017.

^bEach model is adjusted for race, Hispanic ethnicity, age, year of diagnosis, educational attainment, socioeconomic status, insurance status, treatment facility type, facility location, distance from treatment facility, combined receptor status, and clinical stage. Significance was reported with a minimum threshold of $P < .05$.

Accepte

Figure 1: Proportion of Women with cT1-2N0M0 Breast Cancer Status Post Mastectomy vs Breast-Conserving Therapy, Stratified by Race, National Cancer Database, 2004-2017.

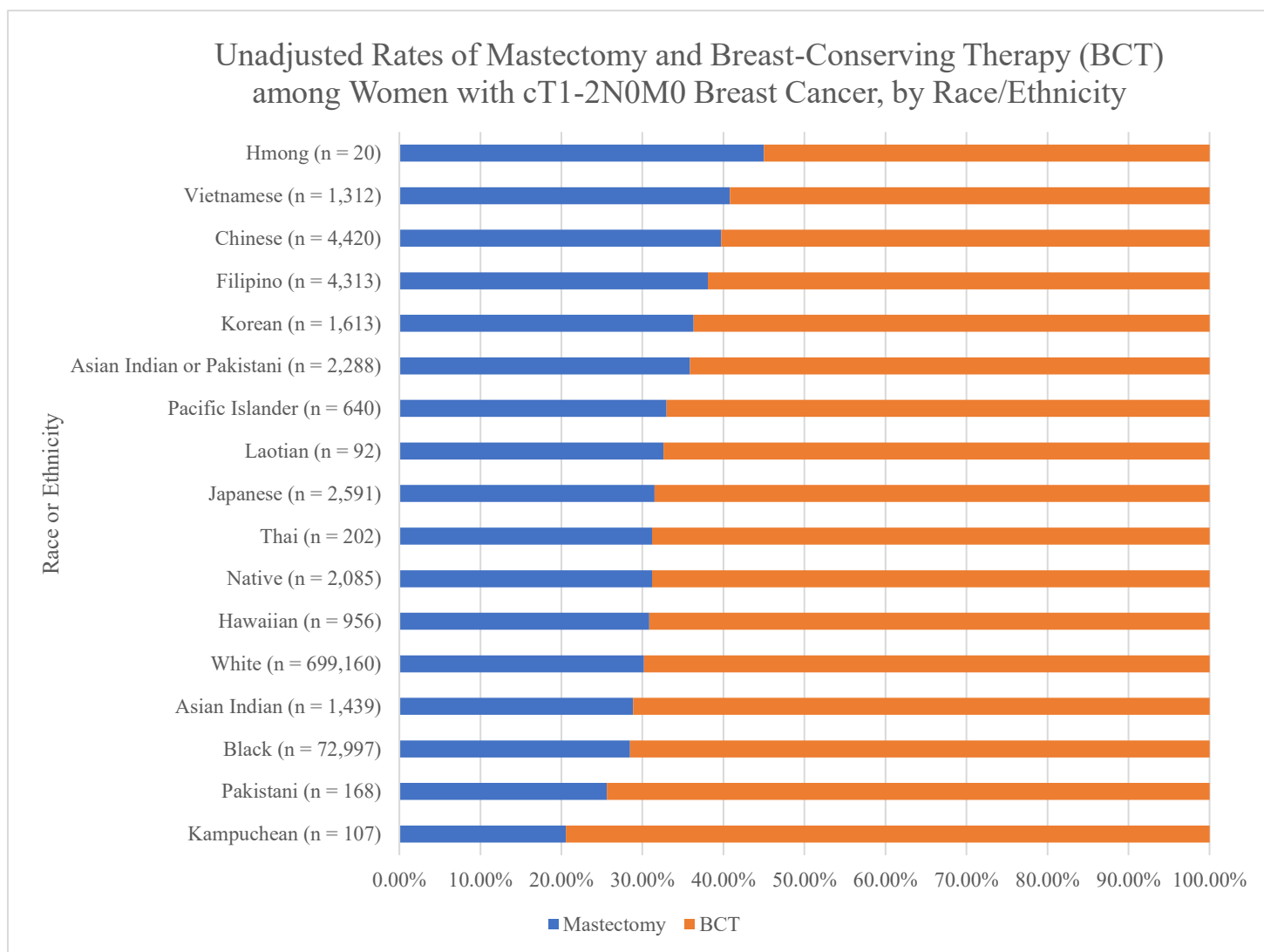


Table 1: Association between Sociodemographic Characteristics and Receipt of Mastectomy vs Breast-Conserving Therapy for Women with cT1-2N0M0 breast cancer, National Cancer Database, 2004-2017. ^a

Characteristic ^b	aOR (95% CI)		cT1 Only		cT2 Only	
	All Patients	P Value		P Value		P Value
No.	794,403	–	627,746	–	166,657	–
Race						
White	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
Black	0.84 (0.83-0.86)	<.001	0.89 (0.88-0.91)	<.001	0.73 (0.71-0.76)	<.001
Native American	0.91 (0.83-1.00)	.05	0.88 (0.78-0.98)	.02	1.01 (0.85-1.20)	.92
Chinese	1.59 (1.50-1.70)	<.001	1.56 (1.45-1.68)	<.001	1.69 (1.49-1.91)	<.001
Japanese	1.16 (1.06-1.26)	.001	1.16 (1.05-1.28)	.002	1.15 (0.96-1.37)	.13
Filipino	1.46 (1.37-1.56)	<.001	1.47 (1.36-1.58)	<.001	1.46 (1.31-1.65)	<.001
Native Hawaiian	1.01 (0.88-1.16)	.88	1.01 (0.86-1.20)	.87	1.01 (0.77-1.31)	.96
Korean	1.30 (1.17-1.44)	<.001	1.28 (1.14-1.45)	<.001	1.32 (1.08-1.60)	.006
Vietnamese	1.50 (1.34-1.68)	<.001	1.59 (1.39-1.82)	<.001	1.34 (1.10-1.64)	.004
Laotian	1.01 (0.65-1.57)	.97	1.00 (0.58-1.72)	.99	1.04 (0.48-2.26)	.91
Hmong	1.53 (0.62-3.76)	.36	1.17 (0.30-4.55)	.82	2.05 (0.58-7.31)	.27
Kampuchean	0.63 (0.39-1.01)	.05	0.62 (0.34-1.10)	.10	0.69 (0.31-1.59)	.38
Thai	1.06 (0.78-1.42)	.75	1.02 (0.71-1.45)	.93	1.17 (0.66-2.07)	.60
Asian Indian and Pakistani	1.27 (1.16-1.39)	<.001	1.27 (1.14-1.41)	<.001	1.29 (1.09-1.52)	.003
Asian Indian	0.91 (0.81-1.02)	.11	0.87 (0.76-1.00)	.05	0.99 (0.80-1.22)	.92
Pakistani	0.77 (0.54-1.09)	.13	0.77 (0.51-1.17)	.22	0.70 (0.36-1.36)	.29
Pacific Islander	1.09 (0.92-1.29)	.30	1.09 (0.89-1.33)	.42	1.11 (0.83-1.49)	.48
Hispanic Ethnicity						
Non-Hispanic	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
Hispanic	0.99 (0.97-1.02)	.47	1.00 (0.97-1.03)	.83	0.96 (0.91-1.01)	.09
Unknown	1.03 (1.00-1.06)	.03	1.04 (1.01-1.07)	.01	1.00 (0.95-1.06)	.93
Age	0.99 (0.993-0.995)	<.001	0.99 (0.988-0.989)	<.001	1.01 (1.00-1.01)	<.001
Year of Diagnosis	1.02 (1.016-1.020)	<.001	1.02 (1.01-1.02)	<.001	1.02 (1.02-1.03)	<.001
Zip Code-Wide Percent Without High School Education						
29.0% or more	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
20.0% to 28.9%	0.99 (0.98-1.01)	.44	0.99 (0.98-1.01)	.61	0.99 (0.96-1.02)	.57
14.0% to 19.9%	1.00 (0.98-1.02)	.79	1.00 (0.98-1.02)	.78	1.00 (0.97-1.04)	.96
Less than 14.0%	1.05 (1.03-1.07)	<.001	1.05 (1.02-1.07)	<.001	1.06 (1.01-1.11)	.009
Zip Code-Wide Median Household Income						
Less than \$30,000	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
\$30,000 - \$34,999	0.99 (0.97-1.01)	.39	0.98 (0.96-0.99)	.02	1.04 (1.01-1.08)	.02
\$35,000 - \$45,999	1.01 (0.99-1.03)	.44	1.00 (0.97-1.02)	.75	1.04 (1.00-1.08)	.03
\$46,000 +	1.01 (0.99-1.03)	.44	1.00 (0.97-1.02)	.86	1.03 (0.99-1.08)	.12

Insurance Status

Not Insured	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
Private	1.04 (0.99-1.08)	.11	1.00 (0.95-1.06)	.97	1.06 (0.99-1.15)	.10
Insurance/Managed Care						
Medicaid	1.06 (1.01-1.11)	.03	1.06 (0.99-1.12)	.08	1.04 (0.96-1.14)	.31
Medicare	1.15 (1.10-1.20)	<.001	1.13 (1.07-1.20)	<.001	1.17 (1.08-1.26)	<.001
Other Government	1.01 (0.94-1.08)	.83	1.00 (0.92-1.07)	.87	0.98 (0.86-1.11)	.74
Unknown	1.02 (0.96-1.09)	.49	0.96 (0.89-1.04)	.34	1.15 (1.02-1.29)	.02

Facility Type

Community Cancer Program	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
Comprehensive Community Cancer Program	1.15 (1.13-1.17)	<.001	1.16 (1.13-1.18)	<.001	1.14 (1.10-1.18)	<.001
Academic/Research Program	1.30 (1.28-1.33)	<.001	1.31 (1.29-1.34)	<.001	1.26 (1.22-1.31)	<.001
Integrated Network Cancer Program	1.24 (1.22-1.27)	<.001	1.24 (1.21-1.28)	<.001	1.24 (1.19-1.30)	<.001

Distance from Treatment Facility

0 to <10 mi	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
10 to <20 mi	1.07 (1.06-1.09)	<.001	1.08 (1.06-1.09)	<.001	1.07 (1.05-1.10)	<.001
20 to <50 mi	1.23 (1.21-1.24)	<.001	1.23 (1.21-1.25)	<.001	1.21 (1.18-1.25)	<.001
≥50 mi	1.50 (1.47-1.53)	<.001	1.53 (1.49-1.56)	<.001	1.43 (1.37-1.49)	<.001

Combined Receptor Status

ER-/PR-/HER2-HER2+	1 [Reference]	N/A	1 [Reference]	N/A	1 [Reference]	N/A
HER2+	1.12 (1.10-1.15)	<.001	1.11 (1.08-1.14)	<.001	1.10 (1.06-1.15)	<.001
HR+/HER2-	0.83 (0.82-0.85)	<.001	0.76 (0.74-0.77)	<.001	0.99 (0.96-1.02)	.53
Unknown	0.84 (0.82-0.86)	<.001	0.77 (0.75-0.80)	<.001	0.95 (0.91-0.99)	.008

Clinical Stage

cT1	1 [Reference]	N/A	–	–	–	–
cT2	1.80 (1.78-1.82)	<.001	–	–	–	–

Abbreviations: OR, Odds Ratio; 95% CI, 95% Confidence Interval.

^aThree separate models are represented, each containing a dependent variable that represents receipt of mastectomy over BCT. The analytic cohort includes women in the National Cancer Database diagnosed with cT1-2N0M0 breast cancer from January 1, 2004, to December 31, 2017.

^bEach model is adjusted for race, Hispanic ethnicity, age, year of diagnosis, educational attainment, socioeconomic status, insurance status, treatment facility type, facility location, distance from treatment facility, combined receptor status, and clinical stage. Significance was reported with a minimum threshold of $P < .05$.