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Racial and socio-economic disparities in breast cancer hospitalization outcomes by insurance status

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ABSTRACT

Background: Breast cancer remains a major cause of morbidity and mortality among women in the US, and despite numerous studies documenting racial disparities in outcomes, the survival difference between Black and White women diagnosed with breast cancer continues to widen. Few studies have assessed whether observed racial disparities in outcomes vary by insurance type e.g. Medicare/Medicaid versus private insurance. Differences in coverage, availability of networked physicians, or cost-sharing policies may influence choice of treatment and treatment outcomes, even after patients have been hospitalized, effects of which may be differential by race.
Purpose: The aim of this analysis was to examine hospitalization outcomes among patients with a primary diagnosis of breast cancer and assess whether differences in outcome exist by insurance status after adjusting for age, race/ethnicity and socio-economic status.
Methods: We obtained data on over 67,000 breast cancer patients with a primary diagnosis of breast cancer for this cross-sectional study from the 2007–2011 Healthcare Cost and Utilization project Nationwide Inpatient Sample (HCUP-NIS), and examined breast cancer surgery type (mastectomy vs. breast conserving surgery or BCS), post-surgical complications and in-hospital mortality. Multivariable regression models were used to compute estimates, odds ratios and 95% confidence intervals.
Results: Black patients were less likely to receive mastectomies compared with White women (OR: 0.80, 95% CI: 0.71–0.90), regardless of whether they had Medicare/Medicaid or Private insurance. Black patients were also more likely to experience post-surgical complications (OR: 1.41, 95% CI: 1.12–1.78) and higher in-hospital mortality (OR: 1.57, 95%: 1.21–2.03) compared with White patients, associations that were strongest among women with Private insurance. Women residing outside of large metropolitan areas were significantly more likely to receive mastectomies (OR: 1.89, 95% CI: 1.54–2.31) and experience higher in-hospital mortality (OR: 1.74, 95% CI: 1.40–2.16) compared with those in metropolitan areas, regardless of insurance type.
Conclusion: Among hospitalized patients with breast cancer, racial differences in hospitalization outcomes existed and worse outcomes were observed among Black women with private insurance. Future studies are needed to determine factors associated with poor outcomes in this group of women, as well as to examine contributors to low BCS adoption in non-metropolitan areas.

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1. Introduction

Breast cancer is a leading cause of loss of more potential life years in women under 65 years of age compared to any other non-traumatic condition in the U.S [1]. Even though it is the most commonly diagnosed cancer among both Black and White women in the United States [2], significant racial disparities are evident both in breast cancer incidence and mortality [3], as well as in receipt of adequate treatment and outcomes [4–9]. Black women continue to experience significantly lower five-year survival rates despite decades of research in this area [10–12], and while numerous reasons have been presented to account for survival disparity, the root cause of the disparity and potential strategies to eliminate them remain elusive. Racial differences in breast cancer outcomes have been attributed to racial differences in access to

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and utilization of high-quality screening and treatment [10,11,13], primary risk factors such as breastfeeding and obesity that are differentially distributed by race [12–15], socioeconomic status [14,16–20], and biological differences such as tumor aggressiveness [21,22].

Differences in healthcare outcomes based on access to healthcare have been a subject of considerable debate in the United States. According to the Centers for Disease control, approximately 36 million people in the United States do not have health insurance, leading to either significant delay or lack of necessary medical care due to significant out of pocket costs [23]. Ayanian et al. showed that women who did not have private insurance, most often obtained through an employer, were more likely to experience adverse outcomes of breast cancer [1]. A few other studies demonstrated treatment differences based on type of insurance; for instance, women with private insurance were more likely to undergo breast conserving surgery compared with those who were uninsured or had Medicaid or Medicare insurance [24–26]. Furthermore, mastectomy rates have also been shown to vary by insurance payer status, with patients on Medicaid insurance more likely to receive mastectomy [27]. National guidelines for breast cancer treatment in the US recommends breast conservation therapy plus radiation in lieu of mastectomy as the preferable treatment option for most women with early stage breast cancer [25]. However, since both treatment modalities are associated with similar survival rates, the decision to have BCS versus mastectomy is likely based on issues of cost as well as individual and physician preference.

Although the influence of insurance status and type of insurance on treatment options have been extensively studied [25,28], it is still not clear whether differences exist in terms of hospitalization outcomes based on insurance type. These differences may be driven by policy-specific differences in allowable procedures, hospital length of stay before discharge, or it may be due to demographic-related differences since patients with private insurance through an employer tend to be younger, healthier and of higher SES compared with patients on Medicare or Medicaid [29]. The aim of this analysis was to examine hospitalization outcomes among patients with a primary diagnosis of breast cancer and assess whether differences in outcome exist by insurance status after adjusting for age, race/ethnicity and socio-economic status.

2. Methods

2.1. Study design and data source

We obtained data for this cross-sectional study from the Healthcare Cost and Utilization project Nationwide Inpatient Sample (HCUP-NIS). The HCUP-NIS discharge database includes administrative claims on hospital inpatient stays representing a 20% of stratified sample of hospitals in the United States, including public hospitals and academic medical centers [1]. This dataset is widely considered the most valid and reliable source of epidemiological data on inpatient care and outcomes in the US. Currently, HCUP covers about 1000 US hospitals with data on over seven million hospital stays. The dataset includes claims on all diagnoses and procedures performed during admission, captured with ICD-9 codes, and also includes non-clinical variables assessed upon admission such as race/ethnicity, residential region, and median household income in the patient's zip code. Further details about NIS can be obtained from: http://www.hcupus.ahrq.gov/nisoverview.jsp.

Clinical Variables: We used the International Classification of Diseases, 9th Revision or the ICD-9 diagnostic and primary procedure codes to identify patients admitted with a primary diagnosis of breast cancer for this analysis. As cancer stage data is not captured in the dataset, a proxy breast cancer stage variable was created using the clinical criteria of disease staging. Patients with breast cancer were assigned into metastatic stage when ICD-9 code indicated metastatic disease to other organs (196.0), non-metastatic stage when those codes were absent, and in-situ stage was defined using ICD-9 code 2330. Multiple previous studies have used similar staging criteria using the HCUP-NIS database [30,44]. To determine the presence of other comorbid conditions among patients, a modified Deyo Comorbidity Index was created using ICD-9 codes to identify major comorbid conditions including: congestive heart failure, chronic pulmonary disease, cerebrovascular disease, diabetes mellitus with or without chronic complications, dementia, myocardial infarctions, rheumatic disease, peripheral vascular disease, mild, moderate or severe liver disease, peptic ulcer disease, renal disease, hemiplegia or paraplegia, and HIV/AIDS. The presence of each condition within each patient was identified and summed up to get a single comorbidity score per patient. The modified Deyo Comorbidity Index was previously used in several studies utilizing the HCUP-NIS database [2–4].

Other Covariates: Our main predictor for this analysis was race/ethnicity (categorized into: White, Black, Hispanic and Other) and area-level income (based on median household income at the zip-code level, divided into quartiles ranging from lowest income zip-code to the highest income zip-code). The aim of this analysis was to determine whether racial and socio-economic disparities in breast cancer hospitalization outcomes differed by insurance status. We defined insurance status using the HCUP insurance variable [1], classified as: Medicaid/Medicare, private (this includes private commercial carriers, Health Maintenance Organizations or HMOs and Preferred Provider Organizations or PPOs) and others (includes self-insured and Worker's Compensation, Title V, and other government programs). We adjusted for *a priori* specified confounders, including age at admission and residential region. Residential region was based on the 2003 version of the Urban Influence Codes [5], and categorized into: large metropolitan areas (with 1 million residents or more), small metropolitan areas (metropolitan areas with less than 1 million residents), micropolitan areas (non-metropolitan areas adjacent to metropolitan areas) and non-metropolitan or micropolitan areas (noncore areas with or without its own town).

2.2. Outcome variable

We focused on three sets of breast cancer hospitalization outcomes in our analysis: first, receipt of surgery (Mastectomy vs Breast conserving surgery or BCS) among patients with a primary diagnosis of breast cancer; second, post-surgical complications among breast cancer patients who received surgery; and third, in-hospital mortality among all women with a primary diagnosis of breast cancer. To address these questions, we created two analytic datasets; the full dataset with all women diagnosed with breast cancer, and a restricted dataset with only patients who received breast cancer surgery. Receipt of surgery was defined based on ICD-9 diagnosis and procedure codes for mastectomy (ICD-9 codes 85.41–85.48), and BCS (ICD-9 codes 85.21, 85.22, 85.23). In-hospital mortality was based on deaths occurring during hospitalization. The presence of post-surgical complications was determined by using ICD-9 codes to identify infections, mechanical wounds, pulmonary, gastrointestinal, urinary cardiovascular and intra-operative complications. HCUP-NIS does not contain information on patient outcomes such as mortality or complications after discharge and so those outcomes were not included in our analysis.

Statistical Analysis: Descriptive statistics was used to examine the differences between baseline study characteristics including