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Disparities in receipt of care for high-grade endometrial cancer: A National Cancer Data Base analysis

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HIGHLIGHTS

- White women were most likely to present with early stage disease.
- African American women had lower all-cause survival compared to white women.
- Hispanic women had higher all-cause survival compared to white women.

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ABSTRACT

Purpose. To examine patterns of care and survival for Hispanic women compared to white and African American women with high-grade endometrial cancer.

Methods. We utilized the National Cancer Data Base (NCDB) to identify women diagnosed with uterine grade 3 endometrioid adenocarcinoma, carcinosarcoma, clear cell carcinoma and papillary serous carcinoma between 2003 and 2011. The effect of treatment on survival was analyzed using the Kaplan-Meier method. Factors predictive of outcome were compared using the Cox proportional hazards model.

Results. 43,950 women were eligible. African American and Hispanic women had higher rates of stage III and IV disease compared to white women (36.5% vs. 36% vs. 33.5%, $p < 0.001$). African American women were less likely to undergo surgical treatment for their cancer (85.2% vs. 89.8% vs. 87.5%, $p < 0.001$) and were more likely to receive chemotherapy (36.8% vs. 32.4% vs. 32%, $p < 0.001$) compared to white and Hispanic women. Over the entire study period, after adjusting for age, time period of diagnosis, region of the country, urban or rural setting, treating facility type, socioeconomic status, education, insurance, comorbidity index, pathologic stage, histology, lymphadenectomy and adjuvant treatment, African American women had lower overall survival compared to white women (Hazard Ratio 1.21, 95% CI 1.16–1.26). Conversely, Hispanic women had improved overall survival compared to white women after controlling for the aforementioned factors (HR 0.87, 95% CI 0.80–0.93).

Conclusions. Among women with high-grade endometrial cancer, African American women have lower all-cause survival while Hispanic women have higher all-cause survival compared to white women after controlling for treatment, sociodemographic, comorbidity and histopathologic variables.

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1. Introduction

In the United States, endometrial cancer is the most common gynecologic malignancy, with 60,050 new cases estimated in 2016 [1]. While the majority of these cases are early stage and of low-grade endometrioid histology, a proportion of women will be diagnosed with an aggressive histologic subtype that confers a greater risk of disease recurrence and increased mortality [2]. African American women have a higher incidence of high-grade histology [3–7], which may contribute to the well-documented increase in overall mortality among African American women [8–12]. While the vast majority of research has focused on the comparison between white and African American women with endometrial cancer, a growing yet limited body of literature has examined differences in disease presentation, treatment patterns and outcomes between Hispanic and non-Hispanic women [7,13–16].

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"Hispanic or Latino" ethnicity is defined by the federal Office of Management and Budget as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race" [17]. Hispanics represent the largest ethnic minority group in the United States, and cancer is the leading cause of death among Hispanic women [18]. Hispanic women, similar to African American women, have a higher incidence of high-grade disease [13,15] and are a vulnerable population disproportionately affected by lower socioeconomic status and barriers to healthcare. While there is substantial racial and cultural diversity within the Hispanic community and significant variation in the literature regarding how Hispanic ethnicity is characterized [19], cancer data are typically presented for Hispanics in aggregate [18]. Despite the heterogeneity within the Hispanic population, there is value in comparing the differences in treatment patterns and clinical outcomes among white women, African American women and Hispanic women with cancer, as such studies are lacking. The objective of this study is to compare the demographics, tumor characteristics, treatment course and overall survival of Hispanic women to non-Hispanic white women and non-Hispanic African American women with high-grade endometrial cancer.

2. Materials and methods

The National Cancer Data Base (NCDB) was used to identify women with high-grade endometrial cancer diagnosed between 2003 and 2011. The NCDB is a nationwide comprehensive clinical surveillance oncology system established by the American Cancer Society and the Commission on Cancer of the American College of Surgeons. Currently, this database captures approximately 70% of newly diagnosed malignancies in the United States, and receives over one million case reports from over 1500 hospitals annually [20]. The NCDB aggregates information about patient demographics, tumor characteristics, cancer-directed therapies, treating facility and overall survival. Data reported to the NCDB are retrospective and de-identified, ensuring confidentiality. This study was exempt from Institutional Review Board oversight.

Women with grade 3 endometrioid adenocarcinoma, carcinosarcoma, clear cell carcinoma and papillary serous carcinoma were considered to have high-grade endometrial cancer and were included in this study [6]. Women diagnosed by death certificate or at autopsy and patients who had other primary cancers were excluded. The variables of interest were race and ethnicity. For this, race and ethnicity variables were combined to construct single mutually exclusive race-ethnicity variables (non-Hispanic white, non-Hispanic African American, Hispanic, other and unknown). Women of other or unknown race and/or ethnicity were excluded from this analysis. The primary outcome of interest was overall survival, defined as months from cancer diagnosis to death or date of the last contact. Secondary outcomes were the receipt of initial treatment after diagnosis of high-grade endometrial cancer. Initial treatment was defined as the first planned course of cancer-directed therapy used to manage the endometrial cancer and excludes treatments initiated for recurrence or relapse of disease [21]. The identification of chemotherapy through the NCDB has been shown in prior studies to be reliable [22–24]. Patients were considered to have been treated with combination adjuvant chemo-radiation if they had received both radiotherapy and chemotherapy within 6 months after diagnosis. We defined definitive surgery as procedures performed with curative intent or in anticipation of a subsequent curative treatment.

Demographic, socioeconomic and clinical variables were categorized according to the NCDB Participant User File Data Dictionary [25]. Control variables included age at diagnosis, year of diagnosis (classified as 2003–2005, 2006–2008, 2009–2011), and geographic location of the treating facility (Northeast, Midwest, South and West). Tumor stage was determined using the revised 2009 staging criteria of the International Federation of Gynecologists and Obstetricians (FIGO) [26]. Stage was determined based on available pathologic records depending on the type of surgery performed. Lymph node status was used to assign stage if lymphadenectomy was performed, otherwise pathologic stage was based on available pathologic data (e.g. depth of tumor invasion or evidence of metastatic disease). A residence was considered rural when the county of residence was "completely rural or had less than 2,500 urban population and was not adjacent to a metro area" as denoted by the United States Department of Agriculture's 2003 Rural-Urban Continuum Codes classification scheme [27]. Median household income was categorized using the average income of the zip code of residence as estimated by either the 2000 census or the community survey data, categorized in quartiles (<$38,000, $38,000–$47,999, $47,000–$62,999 and ≥$63,000). Insurance status was categorized as uninsured, private insurance, Medicare or another type of government insurance (military or Medicaid). The treating facility was categorized according to the Commission on Cancer Accreditation Program as a Community Cancer Program, Comprehensive Community Cancer Program, Academic/Research Program or other. Education level for each patient's area of residence was estimated by matching the zip code of the patient recorded at the time of diagnosis against files derived from the 2012 American Community Survey data, thereby providing a measure of the proportion of adults in the patient's zip code who had attained a given education level. Comorbidity was analyzed using the Klabunde adaptation of the Charlson index; all subjects were assigned a score of 0, 1 or >2 [28,29].

2.1. Statistical analysis

Continuous variables were evaluated by ANOVA, and categorical variables were evaluated by chi square test. Pair-wise comparisons among continuous and categorical variables utilized the Holm-Bonferroni method to adjust for multiple comparisons. Logistic regression models were performed to describe predictors of treatment between racial groups, after adjusting for age, stage, histology, year of treatment, facility type, location, insurance type, education level, socioeconomic status and comorbidity score. Survival curves were calculated using the Kaplan-Meier method and used to compare between racial groups. Cox proportional hazards models were used to calculate adjusted group hazard ratios, and their 95% confidence intervals (CI) were utilized to assess the importance of adjuvant treatment options as an independent predictor of survival after adjusting for the same prognostic factors listed previously. All statistical tests were two-sided, and differences were considered statistically significant at $p < 0.05$. All statistical analyses were performed using *R* 3.0.3 (*R Foundation for Statistic Computing, Vienna Austria*).

3. Results

We identified 43,950 women from the NCDB diagnosed with high-grade endometrial cancer between 2003 and 2011 who met inclusion criteria. Table 1 summarizes the demographic and clinical characteristics of the study population. African American women were more frequently in the lowest quartile of income level (41.5% vs. 12.7% vs. 27.3%, $p < 0.001$) and had a higher comorbidity score of 2 or greater (7.1% vs. 4.7% vs. 4.3%, $p < 0.001$) when compared to white and Hispanic women. Hispanic women were more likely to be uninsured compared to white or African American women (10.9% vs. 2.9% vs. 5.0%, $p < 0.001$).

Analysis of treatment patterns demonstrated that both Hispanic women and African American women were less likely to receive definitive surgical treatment compared to white women (87.5% vs. 85.2% vs. 89.8%, $p < 0.001$). While both Hispanic and African American women had lower rates of lymph node sampling compared to white women (71.9% vs. 69% vs. 75.3%, $p < 0.001$), African American women were the most likely to have positive lymph nodes (22.2% vs. 18.7% vs. 19.6%, $p < 0.001$) compared to white and Hispanic women. African American women were also more likely to receive adjuvant

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