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13. ABSTRACT *(Maximum 200 words)*

The purpose of this study was to measure ethnic differences in treatment and survival between African American (AA) and European American (EA) women with breast cancer. This annual report presents results of the survival analysis.

We abstracted data on cases of breast cancer diagnosed in members of an HMO in metropolitan Detroit between 1986-1996 (N=886) and followed these cases for survival through April 1997 (N=137 deaths).

AA women were diagnosed at a later stage when compared with EA women. Five-year survival was 77% for AAs and 84% for EAs. The crude hazard for AAs relative to EAs was 1.6 (95% confidence interval (CI) 1.1, 2.2). Adjusting only for stage of disease at diagnosis, the hazard ratio was 1.3 (95% CI 0.9, 1.9). Adjusting only for sociodemographics (age, marital status and income), the hazard ratio was 1.2 (95% CI 0.8, 1.9). After adjusting for sociodemographics and stage, the hazard ratio was 1.0 (95% CI 0.7, 1.5).

Among women with similar medical care access, we found ethnic differences in stage of breast cancer at diagnosis. Adjusting for this difference and for income, age and marital status, eliminates the effect of race on survival.

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A Comparison of Breast Cancer Treatment Regimens by Demographic Characteristics (DAMD17-97-1-7302), Annual Report
October, 1998

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INTRODUCTION

In the United States, survival for African American women with breast cancer is inferior to that for European American women. The 1970s and 1980s marked a time of relatively stable rates of mortality among European American women with breast cancer, but increasing rates for African Americans[1]. However, the decline in mortality observed in the early 1990s for European American with breast cancer was not observed in African Americans[1,2]. Poorer survival among African Americans has been attributed to biological characteristics of the tumor, advanced stage at diagnosis, lower socioeconomic status (SES), barriers to health care, diagnostic and treatment delays[3,4] and a higher prevalence of comorbid conditions[5,6]. Although use of mammography by African American women has been reported to lag behind Caucasian women[7], recent research indicates that the racial discrepancy is narrowing[8]. However, it is too soon to see how increased use of mammography among African Americans will affect survival.

While most investigations have found variability in tumor histology at disease presentation across ethnic groups[9-11] and a few have not[12], researchers suggest that the disparity is related more to SES and its impact on diagnostic delays or even a lag in benefitting from medical advancements[13], as opposed to inherent biologic differences. In most studies, use of multivariable models to control for differences in tumor biology and sociodemographic characteristics have reduced but not eliminated the racial differential in survival[6,14-17]. Some studies have attributed the mortality differences to racial disparity in socioeconomic status, with biology playing a lesser role[18-21].

We present analyses of breast cancer survival in a population of HMO members where the screening, diagnosis and treatment patterns are based on practice standards and are similar for all members of the population served within a large, multidisciplinary group practice. We selected this population to minimize heterogeneity in care delivery and to eliminate issues of financial barriers to health care.

BODY

Methods

Setting

The setting for this study was the Health Alliance Plan (HAP) health maintenance organization. HAP is located in Southeastern Michigan and is the largest health maintenance organization in Michigan, with more than 450,000 members. Approximately 20% of these members are African American, 53% are female, and 57% are cared for by physicians in the Henry Ford Medical Group (HFMG). Our study population was drawn from HAP members served by the HFMG. The HFMG is a large multispecialty group practice consisting of a hospital-based clinic in a large urban teaching hospital in Detroit (Henry Ford Hospital) and 26 satellites throughout Southeastern Michigan.

HFHS maintains a computerized tumor registry data base accredited by the American College of Surgeons. Registry staff use a thorough case finding system, including review of all pathology and cytology reports, as well as radiation and oncology consultations. The American Joint Commission on Cancer (AJCC) system is used to determine stage of disease by evaluating tumor size, extent of invasion, involvement of lymph nodes and presence of metastasises.

HFMG Registry staff link these data with the Detroit area Surveillance, Epidemiology and End Results (SEER) program, and conducts annual follow-up for vital status and recurrence. The annual follow-up rate is estimated at 94%.

Ascertainment of Cases

Using the HFMG cancer registry, we identified all African American and European American women with newly diagnosed incident breast cancer initially treated at HFMG from January 1986 through April 1996. To minimize heterogeneity in clinical practice and access to care before diagnosis, we limited the study population to women continuously enrolled in HAP for at least one year before diagnosis and assigned to a primary care physician within the HFMG at the time of diagnosis. We defined continuous enrollment as no more than a 60-day gap in coverage according to membership files.

Outcome Data

We used a several sources to identify follow-up data. First, we obtained vital status, date of death (if applicable) and date last known alive from the HFMG tumor registry. Next, for those women known to be alive, we used HFMG administrative billing data to obtain information about hospitalizations and outpatient visits from January 1986 through April 1997. We used the billing data to update the tumor registry date where appropriate.

Identification of Confounding Variables

Using the tumor registry, we obtained information on tumor characteristics (stage and tumor size) and demographics (date of birth, sex). We geocoded addresses from billing files into

census block groups. We imputed household income to each woman using median household income for block group from the 1990 census data. Information about duration of HAP membership after diagnosis and mammography benefits was downloaded from the HMO membership files.

Statistical Methods.

Before analysis, we categorized age at diagnosis (<55 years vs. ≥55 years), marital status (unmarried, married) and income (imputed household income <$35,000, ≥$35,000). Stage of disease was selected as the variable best describing disease status. We also examined length of enrollment in HAP before diagnosis (<5 years, ≥5 years). These variables were chosen based on known relationships with both breast cancer survival and race (i.e., as potential confounders) rather than through statistical methods for selection of variables.

Association with survival was assessed using the hazard ratio and 95% confidence interval calculated from Cox proportional hazard models, centering continuous variables and using k-1 indicator variables for ordinal variables with k levels. The assumption of proportional hazards was assessed graphically using log-log plots and Schoenfeld's chi-squared goodness-of-fit procedures[22].

We considered the possibility that the method of updating the tumor registry's "date last known alive" with visit data may bias our estimates of survival if one ethnic group was more likely to have contact with the HFMG following diagnosis. Therefore, we conducted the analysis twice: first, we included only tumor registry follow-up dates; second, we used the updated data. We

found negligible differences between the two approaches, therefore, analyses including the updated data are included in this analysis.

Results

We identified 1,321 women members of HAP who were diagnosed with breast cancer between January 1986 through April 1996 and for whom mammography was a fully covered benefit. From this group, we excluded 161 women because they were not assigned to HFMG physicians at the time of diagnosis, and an additional 274 women because they were not continuously enrolled in HAP for one year before diagnosis, for a final sample of 886 women. There was no difference between the study group and the women excluded with respect to the proportion of African Americans (30%).

The median follow-up time was 50 months overall and was similar for African American (49 months for those still alive) and European American women (50 months for those still alive). A total of 137 deaths occurred during the study period. Table 1 shows the baseline demographic and tumor-specific characteristics of the study population. An ordinal logistic regression model indicated that European American women were more likely to have earlier stage disease at diagnosis than African American women ($p=0.007$). Examining this issue more closely, European Americans were more likely than African Americans to have earlier stage (0, I) disease, with a difference of 11% (95% CI 3%, 18%) compared to African Americans. Among those with stage II disease, we found no material difference between African American and European American women in the proportion with lymph node involvement (difference=5%, 95% CI -6%, 17%).

The 5-year survival was 77% for African Americans and 84% for European Americans. The crude estimates, by race are shown in Figure 1. Overall, African Americans had poorer survival compared to European Americans (hazard ratio= 1.6, 95% CI (1.1, 2.2) (Figure 1). There was no evidence of violation of the proportional hazards assumption. Table 2 presents the hazard ratios when we adjusted for stage and sociodemographics, separately and in combination. When stage was added to the model, the hazard ration decreased to 1.3. Adjusting only for sociodemographics, the hazard ratio was reduced to 1.2. Finally, when we controlled for both stage and sociodemographics, the hazard ratio was reduced to 1.0 (95% CI 0.7, 1.5). The survival curves by race, adjusting for sociodemographic characteristics and stage are shown in Figure 2, and reflect this equivalent survival pattern.

CONCLUSIONS

In a setting with equal access to and delivery of health care, we found that adjustment for sociodemographic variables and stage eliminated the racial differences in breast cancer survival. Sociodemographic variables apparently confounded the association between race and survival more than stage of disease. Our conclusions about the effect of sociodemographic factors is similar to those made by some[19-21], but not all[3,6,14,16] studies. Our study adds to the information provided by these others because we included patients within a single HMO and medical group with equal mammography coverage, providing a larger degree of homogeneity in health care access and delivery than in most other studies and perhaps reducing unmeasured differences in confounding factors.

A recent study from the Department of Defense Cancer Tumor Registry found that women with equal access to military care and treatment fared better that the general US population but an unexplained survival difference remained between African American and European American women, even after controlling for stage and other demographic and pathologic factors[23]. However, data on income were not available in this study, however.

The fact that we estimated income from US census data is a limitation of this study. As a result, we expect some degree of misclassification of income. By mapping the addresses to block groups, however, the misclassification should occur to a lesser degree than if we used estimates based on census tracts or zip codes. Our study did not include information on some factors related to survival that also may be related to race, such as treatment and estrogen receptor status.

Nevertheless, we found that in a setting with relatively homogeneous access to health care and treatment, racial differences in survival disappear after adjusting for sociodemographics and stage. Further, census block level income (and what it represents) is a substantial confounder of the race-survival association.

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Table 1. Baseline Demographic and Tumor Characteristics

Variable	African American N = 273	European American N = 613
Sociodemographics		
% Married	(54%)	(59%)
Mean Age (SE) at diagnosis	55 years (± 0.8)	56 years (± 0.5)
Median household income (SE)	$26,000 (± $931)	$44,000 (± $783)
Mean years (SE) HMO enrollment before diagnosis	6.9 years (± 0.3)	5.4 years (± 0.1)
Tumor Characteristics		
Stage 0	17 %	21 %
I	29 %	36 %
II	40 %	33 %
III	9 %	8 %
IV	5 %	3 %
Mean tumor size (SE)	2.4 (± 0.1)	2.1 (± 0.1)

Table 2. Effect of Demographic and Tumor Characteristics on Survival Estimates

Variables in Model	Hazard Ratio (African American versus European American)	95% Confidence Interval
Race Only	1.6	(1.1, 2.2)
Race + Stage	1.3	(0.9, 1.9)
Race + Sociodemographics*	1.2	(0.8, 1.9)
Race + Stage + Sociodemographics*	1.0	(0.7, 1.5)

* Age, marital status and median household income

Figure 1. Crude Kaplan-Meier Survival Estimates, by Race

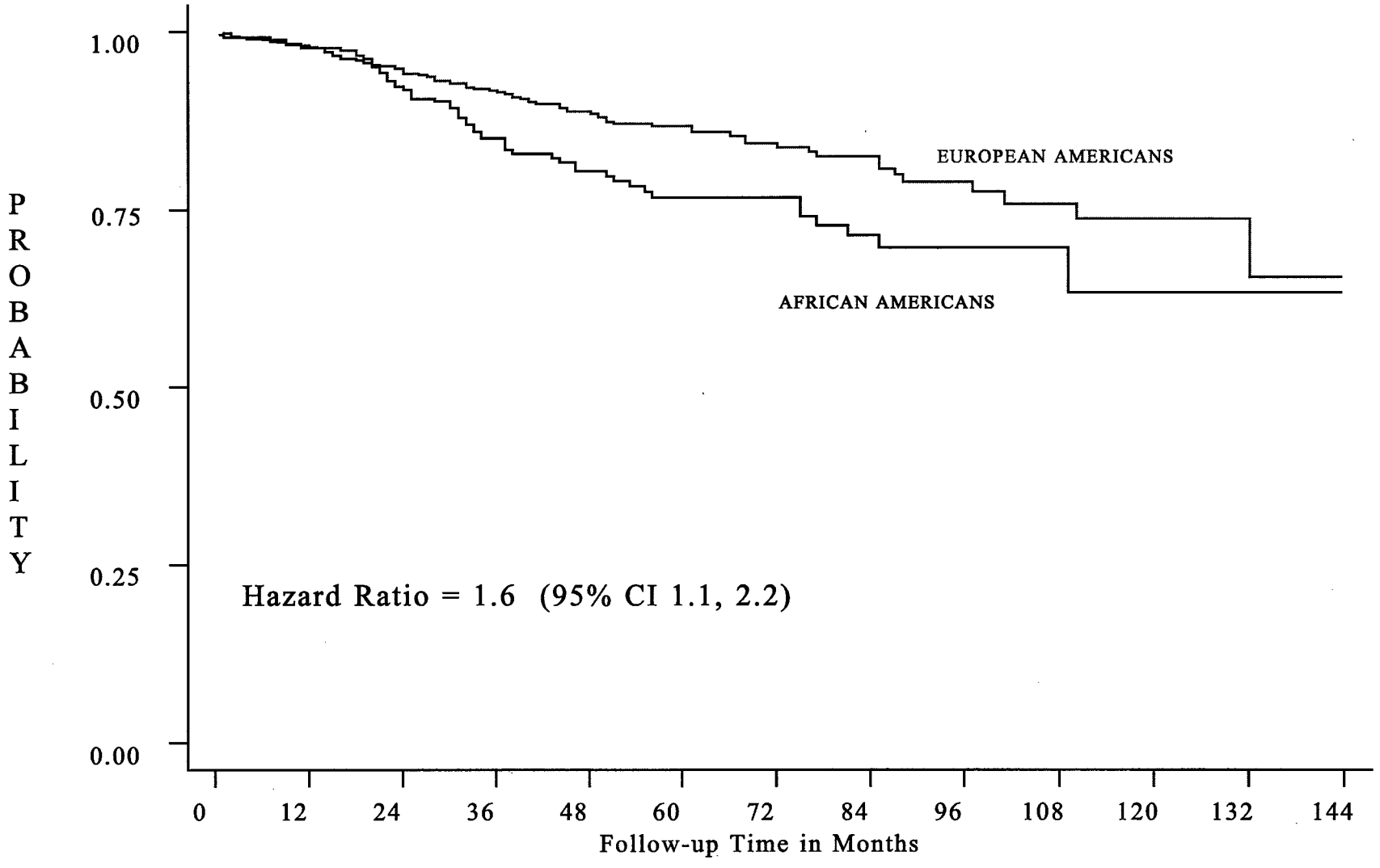
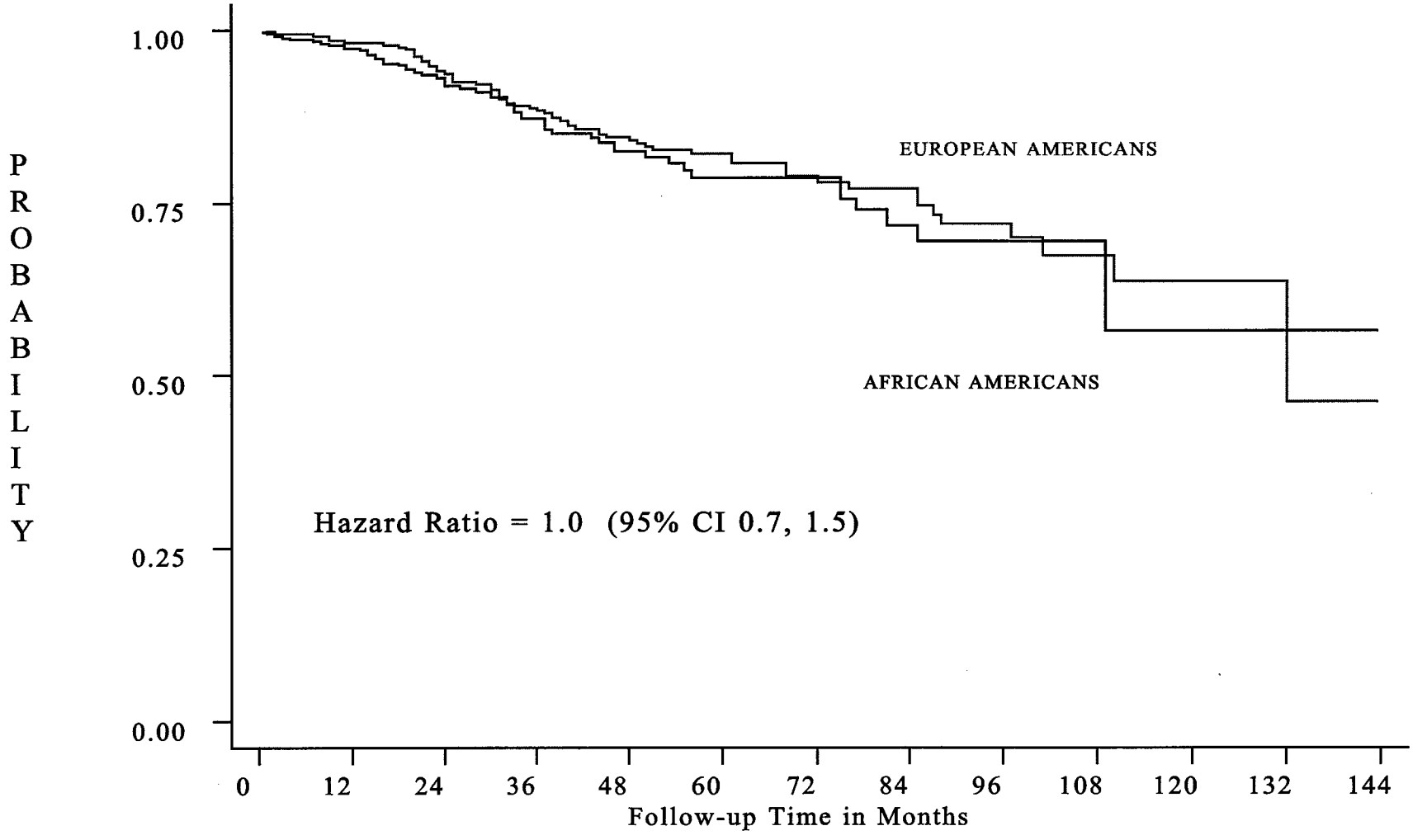


Figure 2. Survival by Race, Adjusted for Age, Income & Marital Status and Stage



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