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Comorbidites and endometrial cancer survival in Hispanics and non-Hispanic whites

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Abstract

Purpose—We investigated comorbidities and endometrial cancer survival by ethnicity because Hispanic whites (HWs) have worse survival than non-Hispanic whites (NHWs).

Methods—An endometrial cancer cohort (1992–2004) established with the Surveillance, Epidemiology and End Results-Medicare linked database (n=3286) was followed through 2007. Endometrial cancer-specific and other cause mortality were evaluated with multivariate hazard ratios (mHRs).

Results—HWs were more likely than NHWs to have regional/distant disease (31.7% vs. 24.8%), diabetes (31.7% vs. 11.0%), and hypertension (49.4% vs. 37.6%). HWs had poorer endometrial cancer-specific survival than NHWs (age-adjusted HR=1.28; 95%CI 1.01–1.61), but not after adjustment for tumor characteristics and treatment (mHR=1.02; 95%CI 0.81–1.29). In contrast, even after adjustment for cancer-related factors, other cause mortality in HWs was elevated (mHR=1.27; 95%CI 1.01–1.59), but not after further adjustment for comorbid conditions (mHR=1.07; 95%CI 0.85–1.35).

Conclusions—Comorbidities, particularly diabetes, were more common in HWs than NHWs and impacted other cause mortality. Improving diabetes management may be an effective means of improving other cause mortality. This may be particularly true for HWs, given their particularly high prevalence of diabetes.

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Keywords

endometrial neoplasms; comorbidities; survival; SEER; Medicare

INTRODUCTION

Uterine cancer is the most common gynecologic cancer and is broadly grouped into three types: carcinomas, sarcomas, and a mixture of these two, the carcinsarcomas [1;2]. On a population basis, endometrial carcinomas (including the adenocarcinomas) comprise about 85% of all uterine cancers [3]. Early stage endometrial cancer has a good prognosis, but five-year survival falls to 20% for stage IV cancers [4]. Disparities in endometrial-specific cancer survival between whites and blacks have been studied [5–7], but little is known about disparities between non-Hispanic whites (NHWs) and Hispanic whites (HWs). HW women have a lower age-adjusted *incidence* of uterine cancer than NHWs, but overall *mortality* is more similar than would be expected based on the incidence, indicating an overall poorer survival for HWs relative to NHWs.

While the reasons for this disparity are unknown, a higher prevalence of comorbidities such as diabetes [8] and hypertension [9] in HWs relative to NHWs is one possible explanation, as these comorbidities may reduce survival following cancer diagnoses [10–14]. Additionally, hypertension and diabetes are risk factors for endometrial cancer [15–18]. Thus comorbidities may explain part or all of the survival disparities between HWs and NHWs. It is also possible that HW are more likely to have advanced cancers or more likely to have a more aggressive cancer than NHWs. We used the Surveillance, Epidemiology and End Results (SEER)-Medicare linked database to establish a cohort of HW and NHW women with endometrial cancer in New Mexico (NM) and three areas in California to evaluate the impact of comorbid conditions on survival and to determine if tumor and treatment factors or if comorbidities accounted for differences in survival.

METHODS

Data sources

We used the linked SEER-Medicare database [19] that included cancer cases reported to the SEER program from 1992–2004 and Medicare claims from 1991–2007. The SEER program is a compilation of population-based cancer registries for cancer surveillance in the US[20]. In each SEER region, information on demographic factors, cancer characteristics, initial treatment, and vital status is collected. We restricted our analysis to four SEER registries with substantial Hispanic populations: Los Angeles, CA; San Francisco-Oakland, CA; San Jose-Monterey, CA; plus, the NM registry. Medicare provides health care insurance for 97% of persons age ≥65 years in the US. For Medicare beneficiaries enrolled in the fee-for-service plan (parts A and B), information regarding diagnoses, hospitalizations, and procedures are captured in the Medicare claims files. This research study received ethical approval from the Health Research Protections Office of the University of New Mexico.

Race and Ethnicity

The SEER variable for Hispanic origin uses the North American Association of Central Cancer Registries Hispanic Identification Algorithm (NHIA) for cases diagnosed since 1992. The NHIA variable is an algorithm that uses Spanish/Hispanic surname or Spanish origin to classify cases as Hispanic [21]. We cross-classified the NHIA variable with the SEER race variable restricted to whites only because Hispanics may be of any race (white,

black, etc.), and we sought to avoid confounding by race. The SEER race/ethnicity variables were used as they have greater specificity than the analogous Medicare variables [22].

Study cohort

In the linked database, we identified all women ≥66 years of age diagnosed with first primary, invasive endometrial cancer (ICD-O-3 [23] sites 54.0–54.3, 54.8, 54.9, and 5.59 with histology codes as outlined in Appendix Table 1) between 1992 and 2004. These years have consistent and systematic coding of Hispanic ethnicity, and ensure at least 3 years of follow-up for each case. We excluded women aged 65 years at diagnosis to ensure at least one year of Medicare claims prior to diagnosis to identify comorbid conditions. Women who did not have microscopic verification of cancer, who were diagnosed only at the time of death, or who were enrolled in a managed care plan in the 12 months before diagnosis or at any time during follow-up were excluded. We further restricted to women identified by SEER as NHW or HW. Thus 2964 NHW and 322 HW women formed the study cohort (see Appendix Figure 1).

Comorbidities and Comorbidity weights

We assessed co-morbidities via the well-established index developed by Charlson [24], Deyo [25], and Romano [26] as presented on the SEER-Medicare website [27] using both inpatient and outpatient claims. We also used an established and validated algorithm [28] to determine diabetes within two years of cancer diagnosis. Hypertension was defined by the presence of two Medicare claims at least 30 days apart containing ICD-9 [29] codes 401, 402, 403, 404, or 416.

The presence of comorbid conditions may vary by cancer site and may have a different relation with mortality due to competing causes of death. Therefore, we determined comorbid condition weights for all cases diagnosed from 1992–2004 with follow-up through 2007 in 12 SEER registries (see Appendix Table 2) [30]. Using Cox proportional hazards, comorbid conditions were used to predict 2-year mortality from causes other than cancer; those who died of cancer in this time frame were censored. All models included age at diagnosis and cancer stage using the SEER summary staging variable (local, regional/distant, and unknown) [31]. These more contemporary endometrial cancer-specific comorbidity weights are presented with the analogous Charlson comorbidity weights in Appendix Table 2.

Patient and disease characteristics

Ethnicity (NHW, HW, described above), age at diagnosis, year of cancer diagnosis, and number of cancer diagnoses were identified from SEER. Using SEER we classified tumor stage into three groups (local, regional/distant, unknown) and tumor histology into two groups (Type I vs. Type II – see Appendix Table 1). From both in-patient and out-patient Medicare claims we identified cancer treatments (hysterectomy, radiation therapy, and chemotherapy) for cases within the year following diagnosis (Appendix Table 3); no SEER surgery/treatment information was used. Information on education, rural residence and income at the time of diagnosis was provided in the linked dataset and was estimated from aggregate census tract data from the US Census Bureau. These attributes were assigned per the 2000 decennial census for women diagnosed in 1998 and per the 1990 decennial census for women diagnosed earlier.

Statistical analyses

The characteristics of NHW and HW women with cancer were compared with respect to demographic, tumor, and treatment characteristics as well as the presence of diabetes,

hypertension, and other comorbid conditions using $\chi 2$ statistics. We also compared women with and without diabetes, hypertension, and other conditions with respect to tumor characteristics and treatment. Multivariate hazard ratios (mHRs) were estimated through Cox proportional hazards modeling [32] to evaluate ten-year cancer-specific survival and other survival associated with the presence of comorbid conditions for HWs relative to NHWs. Cancer-specific survival was based on death due to endometrial cancer as per the method described in Howlader et al [33]. To isolate death due to endometrial cancer form all other causes of death, we also determined other survival as death due to any cause except endometrial cancer. In either case, patients who were not known to be deceased were censored at the date of last information [33]. We estimated HRs for ethnicity adjusted for age at diagnosis, year of diagnosis, stage of disease, tumor type (I vs. II), and receipt of surgery, chemotherapy, radiation therapy; further adjustment for marital status, metropolitan residence, and tumor grade did not alter the risk estimates and were not included in the models. By expanding this model, we evaluated the impact of the comorbidities and the impact of census tract education and income. Survival analyses were conducted with SAS®, Version 9.3 (SAS Institute, Cary, NC).

RESULTS

HWs were younger at diagnosis and were more likely to reside in non-metro areas, in neighborhoods with low median incomes, and in those with low education attainment than NHWs (all p-values <0.05) (Table 1). HWs were also more likely to have later stage disease (for regional/distant stage, 31.7% vs. 24.8%) (p-value =0.011). Hysterectomy was common in both groups, but HWs were less likely to have had surgery and more likely to have radiation and chemotherapy than NHWs (all p-values <0.05).

HWs were more likely to have diabetes (31.7% vs. 11.0%) and hypertension (49.4% vs. 37.6%) than NHWs (p-values <0.001)(Table 1). In the standard Charlson comorbidity score excluding diabetes, there was little difference in the percentage of HWs and NHWs with a score of 1 (14.0% vs. 14.6%, respectively) or 2+ (6.5% vs. 5.2%, respectively). As described in the methods, we re-calculated the weighting of comorbid conditions to reflect a more contemporary two-year mortality experience of all endometrial cancer patients in 12 SEER regions (Appendix Table 2). When applied to our cohort, the difference in the weighting for each of the comorbidities shifted some women with a Charlson score of 1 to either a higher or lower score in both HWs and NHWs. This resulted in scores of 2+ for 9.0% of HWs and 7.7% of NHWs, but there was still little difference between HWs and NHWs. These more contemporary scores were used in all subsequent analyses.

Overall, diabetes was not strongly associated with tumor characteristics or non-surgical treatment in our cohort, but it was associated with hysterectomy: 93.2% of women without diabetes had the surgery versus 88.8% of those with diabetes (p-value <0.01) (Table 2). Hypertension was not strongly associated with tumor characteristics or treatment, except that Type II tumors were more likely in those with hypertension (14.9% vs. 11.3%) (p-value= 0.02). In contrast, the proportion of women with local disease or surgery decreased with comorbidity scores of 0, 1, 2+ (for local disease, 71.7%, 70.9%, and 61.3%, and for surgery, 94.5%, 88.4%, 75.0%, respectively) (p-values <0.05). Comorbidities were strongly associated with census tract income and education (p-values <0.001). To avoid colinearity in subsequent models, we adjusted for only one of the census tract variables (education).

For comorbidities and survival, the pattern of survival between HWs and NHWs was similar. Diabetes at cancer diagnosis did not strongly impact disease-specific survival, but was associated with poorer other-survival for both HWs and NHWs (HWs, HR=2.67, 95%CI=1.64, 4.35 and NHWs, HR=1.86, 95%CI=1.52, 2.28) (Table 3). Even though

women with hypertension were more likely to have Type II tumors, the presence of hypertension was not strongly related to survival. For comorbidity scores, a score of 2+ was associated with a modest elevation in death from endometrial cancer among NHW women (HR=1.38, 95%CI=1.04, 1.82), but not among HW women; whereas for death from other causes, a score of 2+ was associated with poorer survival for both groups (HWs, HR=3.22, 95%CI=1.78, 5.81 and NHWs, HR=2.24, 95%CI=1.79, 2.80).

Both disease-specific death and death from all other causes was higher for Hispanic women than for non-Hispanic women (Table 4). For endometrial cancer-specific death, the age-adjusted HR for HWs compared to NHWs was 1.28 (95% CI 1.01, 1.61). Adjustment for disease characteristics and treatment removed a difference in risk by ethnicity (HR=1.02 95% CI 0.81, 1.29). Further adjustment for comorbidities and education did not alter the HRs appreciably. In contrast, for death from all other causes, the age-adjusted hazard ratio (HR) for HWs compared to NHWs was 1.37 (95%CI 1.09, 1.72). Adjustment for disease characteristics and treatment reduced the HR to 1.27 (95% CI 1.01, 1.59). However, addition of comorbidities removed a difference in risk by ethnicity (HR= 1.07 95% CI 0.85, 1.35). Adjustment for education also removed the difference in risk difference by ethnicity (HR= 1.12 95% CI 0.89, 1.42).

DISCUSSION

We found that HWs were much more likely than NHWs to have diabetes and hypertension, but only slightly more likely to have other comorbid conditions. The presence of comorbid conditions was related to some tumor characteristics and treatment (particularly surgery). Nonetheless, the comorbid conditions were not strongly related to death from endometrial cancer, but were more strongly associated with death from other causes. We initially found that HWs had poorer survival than NHWs, but for endometrial cancer-specific survival, this disparity was explained in our model by disease/tumor factors and treatment. The residual disparity for other causes of death following adjustment for disease/tumor factors and treatment was explained by the presence of comorbid conditions.

There was a strong correlation between comorbidities and summary indicators of income and education. Thus, adjustment for education had a similar effect as adjustment for comorbidities when assessing survival in HWs relative to NHWs. Others have noted similar associations between socioeconomic (SES) indicators and morbidity [34–36]. Indicators of lower socioeconomic status were strongly associated with poorer health and a higher probability of morbidity in the Women's Health Initiative for women of a similar age as those in our study [34]. The high correlation between comorbidities and SES factors in our data makes it difficult to parse the contribution to survival variation when they are modeled together. A strength of our study is that we determined individual comorbid conditions for each women using Medicare billing records. However, a limitation is that we did not have individual level SES information for these same women. It is possible that individual level SES information could have helped separate the independent contribution of comorbidities versus SES indicators.

We found that HWs in this older group of women were more likely than NHWs to have higher stage disease. Two other studies that included women of all ages reported little difference in disease characteristics by Hispanic ethnicity, but in each study HWs had a much younger age distribution than NHWs [37;38]. Our results may differ because of our Medicare population (age >= 65 years) and the direct comparison of postmenopausal HWs to postmenopausal NHWs. In our study, although the ethnic differences for disease characteristics were not dramatic, these differences and modest treatment differences accounted for the survival disparity in endometrial cancer-specific survival. It is unclear why

HWs would have a different disease presentation than NHWs in this older population of women; little research has been done on endometrial cancer risk factors and disease presentation in Hispanic women. Access to health care, lack of health care insurance, distance to care, diagnosis delays, differences in tumors, and differences in risk factors that lead to more aggressive tumors have been suggested as possible explanations for differences [39]. Presumably, health care insurance was not an issue in our analysis because everyone had Medicare coverage. However, our study population came from geographically large states. Given that cancer diagnosis and care is quite specialized, it is possible that distance to care or travel time was an important issue, but whether this was differential between HWs and NHWs is unknown. There could also be risk factor differences between HW and NHWs or differences in molecular features of their tumors that are associated with more advanced disease. Early stage endometrial cancer has an excellent prognosis, making all of these areas worthy of further study to reduce the severity of disease in HWs at diagnosis, and ultimately improve endometrial cancer-specific survival. Our study has other potential limitations in addition to those already discussed. Although we used an established algorithm for Hispanic ethnicity[21;40], there was, inevitably, some isclassification that would diminish differences by ethnicity in our results. We used validated algorithms for diabetes[28] and comorbidities [24], but there is no analogous algorithm for hypertension; thus, our finding that hypertension was not strongly associated with mortality could be due to misclassification. We did not have data on treatment for comorbidities, and such treatment could influence mortality. We did not have body mass information, which may [12] or may not [41;42] be related to endometrial cancer survival. Our results suggest that older HWs had a more serious disease presentation than NHWs, and that coupled with modest treatment differences explained the disparity in cancer-specific survival. The reasons for a difference in disease presentation are unknown, but may be worthy of further study to improve endometrial cancer-specific survival in HW women. In this population of older women, diabetes was common: 32% in HWs and 11% in NHWs and was similar to that reported in the National Health and Nutritional Examination Survey (NHANES) (24% in Hispanics and 14% in NHWs) [43]. We found that diabetes was a strong predictor of mortality in both HWs and NHWs. Others have also found this [10–14] but not universally [44]; however, none of these studies evaluated Hispanic women. Indeed, when comparing mortality in HWs to NHWs, adjusting for diabetes alone was almost identical in impact to adjusting for all the comorbid conditions. This suggests that diabetes was driving the difference in other cause mortality between HWs and NHWs. Given the prevalence of diabetes in these cases, it is possible that efforts towards improving diabetes management may be an effective means of improving other cause mortality. This may be particularly true for HWs, given their particularly high prevalence of diabetes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Characteristics of endometrial cancer cases by Hispanic ethnicity.

Characteristic	**Hispanic White**		**Non-Hispanic White**		**χ^2 P-value**
	N=322	**(%)**	**N=2964**	**(%)**	
Age at Diagnosis (years)					0.004
66–69	88	(27.3)	566	(19.1)	
70–74	83	(25.8)	798	(26.9)	
75–79	82	(25.5)	761	(25.7)	
80–84	44	(13.7)	498	(16.8)	
85+	25	(7.8)	341	(11.5)	
Year of Diagnosis					0.002
1992–1994	79	(24.5)	864	(29.1)	
1995–1997	64	(19.9)	773	(26.1)	
1998–2000	75	(23.3)	587	(19.8)	
2001–2004	104	(32.3)	740	(25.0)	
Marital Status at Diagnosis					
Married	123	(38.2)	1311	(44.2)	0.110
Not married	192	(59.6)	1587	(53.5)	
Unknown	7	(2.2)	66	(2.2)	
Median Income (Census Tract)					<0.001
Quartile 1 ($7,117–$36,522)	153	(47.5)	659	(22.2)	Trend, <0.001[a]
Quartile 2 ($36,542–$50,039)	79	(24.5)	734	(24.8)	
Quartile 3 ($50,055–$69,012)	46	(14.3)	765	(25.8)	
Quartile 4 ($69,020–$200,008)	41	(12.7)	772	(26.1)	
unknown	3	(0.9)	34	(1.2)	
Percent non-High School Graduate (Census Tract)					<0.001
Tertile 1 (0.18%–8.02%)	33	(10.3)	1048	(35.4)	Trend,<0.001 [a]
Tertile 2 (8.03%–17.96%)	74	(23.0)	1011	(34.1)	
Tertile 3 (17.97%–79.70%)	212	(65.8)	871	(29.4)	
unknown	3	(0.9)	34	(1.2)	
Urban residence					0.005

Characteristic	Hispanic White		Non-Hispanic White		χ^2 P-value
	N=322	(%)	N=2964	(%)	
Metro	293	(91.0)	2809	(94.8)	
Non-metro	29	(9.0)	155	(5.2)	
Subsequent Cancer					0.531
no	272	(84.5)	2542	(85.8)	
yes	50	(15.5)	422	(14.2)	
Stage					0.011
Local	205	(63.7)	2124	(71.7)	
Regional/Distant	102	(31.7)	735	(24.8)	
Unstaged	15	(4.7)	105	(3.5)	
Histology					0.151
Type I	273	(84.8)	2596	(87.6)	
Type II	49	(15.2)	368	(12.4)	
Grade					0.236
Well differentiated	97	(30.1)	1062	(35.8)	trend:0.029[a]
Moderately differentiated	114	(35.4)	984	(33.2)	
Poorly differentiated or undifferentiated	88	(27.3)	725	(24.5)	
Not graded	23	(7.1)	193	(6.5)	
Hysterectomy					0.022
No	34	(10.6)	209	(7.1)	
Yes	288	(89.4)	2755	(92.9)	
Radiation					0.004
No	210	(65.2)	2157	(72.8)	
Yes	112	(34.8)	807	(27.2)	
Chemotherapy					0.013
No	291	(90.4)	2748	(92.7)	
Yes	31	(9.6)	216	(7.3)	
Diabetes					<0.001
No	220	(68.3)	2637	(89.0)	
Yes	102	(31.7)	327	(11.0)	
Hypertension					<0.001

Characteristic	Hispanic White		Non-Hispanic White		χ^2 P-value
	N=322	(%)	N=2964	(%)	
No	163	(50.6)	1850	(62.4)	
Yes	159	(49.4)	1114	(37.6)	
Charlson comorbidity score [b]					0.575
0	256	(79.5)	2379	(80.3)	
1	45	(14.0)	432	(14.6)	
2+	21	(6.5)	153	(5.2)	
Comorbidity score (endometrial cancer mortality weighted)[b]					0.658
0	276	(85.7)	2565	(86.5)	
1	17	(5.3)	172	(5.8)	
2+	29	(9.0)	227	(7.7)	

a: Cochran-Armitage trend (excluding the “not graded” group for grade).

b: diabetes excluded

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Table 2

Tumor characteristics, treatment, and selected demographics by comorbidities

	Diabetes		**Hypertension**		**Comorbidity Scores (without diabetes)**[a]		
	yes	**no**	**yes**	**no**	**0**	**1**	**2+**
	N (%)	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Histology							
Type I	370 (86.3)	2499 (87.5)	1083 (85.1)	1786 (88.7)	2491 (87.7)	164 (86.8)	214 (83.6)
Type II	59 (13.8)	358 (12.5)	190 (14.9)	227 (11.3)[b]	350 (12.3)	25 (13.2)	42 (16.4)
SEER Stage							
Local	291 (67.8)	2038 (71.3)	897 (70.5)	1432 (71.1)	2038 (71.7)	134 (70.9)	157 (61.3)
Regional/Distant	118 (27.5)	719 (25.2)	333 (26.2)	504 (25.0)	720 (25.3)	46 (24.3)	71 (27.7)
Unknown	20 (4.7)	100 (3.5)	43 (3.4)	77 (3.8)	83 (2.9)	9(4.8)	28 (10.9)
Grade							
Well	135 (31.5)	1024 (35.8)	443 (34.8)	716 (35.6)	1010 (35.6)	70 (37.0)	79 (30.9)
Moderate	163 (38.0)	935 (32.7)	409 (32.1)	689 (34.2)	965 (34.0)	48 (25.4)	85 (33.2)
Poor	106 (24.7)	707 (24.8)	327 (25.7)	486 (24.1)	691 (24.3)	55 (29.1)	67 (26.2)
Unknown	25 (5.8)	191 (6.7)	94 (7.4)	122 (6.1)	175 (6.2)	16 (8.5)	25 (9.8)
Treatment							
Hysterectomy	381 (88.8)	2662 (93.2)[b]	1166 (91.6)	1877 (93.2)	2684 (94.5)	167 (88.4)	192 (75.0)[b]
Radiation	124 (28.9)	795 (27.8)	377 (29.6)	542 (26.9)	791 (27.8)	53 (28.0)	75 (29.3)
Chemotherapy	30 (7.0)	217 (7.6)	105 (8.3)	142 (7.1)	221 (7.8)	17 (9.0)	9 (3.5)[b]
Median Income							
$7,117–$36,522	145 (33.8)	667 (23.4)	340 (26.7)	472 (23.5)	679 (23.9)	41 (21.7)	92 (35.9)
$36,542–$50,039	126 (29.4)	687 (24.1)	339 (26.6)	474 (23.6)	686 (24.2)	63 (33.3)	64 (25.0)
$50,055–$69,012	94 (21.9)	717 (25.1)	319 (25.1)	492 (24.4)	710 (25.0)	46 (24.3)	55 (21.5)
$69,020–$200,008	61 (14.2)	752 (26.3)[b]	264 (20.7)	549 (27.3)[b]	734 (25.8)	36 (19.1)	43 (16.8)[b]
Unknown	3 (0.7)	34 (1.2)	11 (0.9)	26 (1.3)	32 (1.1)	3 (1.6)	2 (0.8)
Percent Non-High School Graduates							
0.18%–8.02%	80 (18.7)	1001 (35.0)	353 (27.7)	728 (36.2)	963 (33.9)	57 (30.2)	61 (23.8)

	Diabetes		Hypertension		Comorbidity Scores (without diabetes)[a]		
	yes	no	yes	no	0	1	2+
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
8.03%–17.96%	115 (26.8)	970 (34.0)	419 (32.9)	666 (33.1)	945 (33.3)	67 (35.5)	73 (28.5)
17.97%–79.70%	231 (53.9)	852 (29.8)[b]	490 (38.5)	593 (29.5)[b]	901 (31.7)	62 (32.8)	120 (46.9)[b]
Unknown	3 (0.7)	34 (1.2)	11 (0.9)	26 (1.3)	32 (1.1)	3 (1.6)	2 (0.8)

a: determined with endometrial-cancer-specific comorbidity weights

b: Chi-Square p-value <0.05

Table 3

Comorbid conditions and mortality following endometrial cancer diagnosis by ethnicity.

	Hispanic Whites				Non-Hispanic Whites			
	Cancer-specific mortality		Other mortality		Cancer-specific mortality		Other mortality	
Comorbid	**HR[a]**	**(95%CI[b])**	**HR[a]**	**(95%CI)**	**HR[a]**	**(95%CI)**	**HR[a]**	**(95%CI)**
Conditions								
Diabetes								
No	1.0		1.0		1.0		1.0	
Yes	0.76	(0.44,1.31)	2.67	(1.64,4.35)	1.25	(0.96,1.62)	1.86	(1.52,2.28)
Hypertension								
No	1.0		1.0		1.0		1.0	
Yes	1.21	(0.75,1.98)	1.24	(0.75,2.06)	0.93	(0.79,1.10)	1.16	(0.99,1.35)
Comorbidity Score								
0	1.0		1.0		1.0		1.0	
1	0.59	(0.18,2.01)	1.35	(0.54,3.38)	1.15	(0.83,1.63)	1.78	(1.37,2.31)
2+	0.88	(0.32,2.38)	3.22	(1.78,5.81)	1.38	(1.04,1.82)	2.25	(1.80,2.82)

a: HR= hazard ratio, adjusted for: age at diagnosis; year of diagnosis; stage of disease; tumor type [I vs. II]; receipt of surgery, chemotherapy, radiation therapy; and each comorbid condition variable is adjusted for the other two condition variables in the table.

b: CI=confidence interval

Table 4

Mortality in Hispanic white women relative to non-Hispanic white women with endometrial cancer.

	Cancer-specific Mortality		Other Mortality	
Model Adjustments	**HR[a,b]**	**95%CI[c]**	**HR**	**95%CI**
Model 1: age at diagnosis	1.28	(1.01, 1.61)	1.37	(1.09, 1.72)
Model 2: Model 1 plus year of diagnosis, stage, type (I vs. II), and treatment (receipt of surgery, chemotherapy, radiation therapy)	1.02	(0.81, 1.29)	1.27	(1.01, 1.59)
Model 3: Model 2 plus comorbidities (diabetes, hypertension, other conditions)	0.99	(0.78, 1.26)	1.07	(0.85, 1.35)
Model 4: Model 2 plus education	0.97	(0.76, 1.23)	1.12	(0.89 1.42)
Model 5: All of the above variables	0.95	(0.74, 1.21)	1.00	(0.79,1.27)

a: HR=hazard ratio

b: Hispanic white vs non-Hispanic white

c: CI=confidence interval