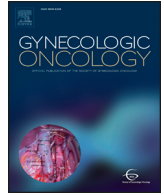




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## Impact of hospital volume on racial disparities and outcomes for endometrial cancer<sup>☆</sup>

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### HIGHLIGHTS

- Black race is an independent predictor of mortality for women with endometrial cancer.
- Black women with endometrial cancer are more likely to receive treatment at a high volume hospital.
- The impact of race on mortality is mitigated, albeit not eliminated, by increasing hospital volume.

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### ABSTRACT

**Objective.** Little is known about the influence of hospital procedural volume on racial disparities for uterine cancer. We examined whether the magnitude of the survival differential between black and white women varied based on hospital procedural volume for endometrial cancer.

**Methods.** We utilized the National Cancer Data Base to examine women with endometrial cancer from 1998 to 2012. Annualized hospital procedural volume was calculated and hospitals grouped into volume-based quartiles. Multivariable models were developed to examine differences in two and five-year survival between black and white women across the hospital volume categories. Patients were classified as early or advanced stage and as type I (low grade, endometrioid) or type II (high grade endometrioid, other histologies) cancers.

**Results.** We identified 243,422 (75.0%) white and 27,764 (8.6%) black women treated at 1059 hospitals. Regardless of hospital volume, black women had decreased survival. For each tumor class, the absolute difference in adjusted two-year survival between black and white women decreased with increasing hospital volume. For example, for women with early-stage, type I tumors, the adjusted two-year survival differential between blacks and whites was  $-1.4\%$  (95%CI,  $-2.4$  to  $-0.5\%$ ) at low volume centers and decreased to  $-0.5\%$  (95%CI,  $-0.9$  to  $0\%$ ) at high-volume hospitals ( $P < 0.0001$ ). For advanced stage, type I tumors, the adjusted survival differential decreased from  $-12.4\%$  (95%CI,  $-24.0$  to  $-0.9\%$ ) to  $1.2\%$  (95%CI,  $-2.9$  to  $5.3\%$ ) at high volume hospitals ( $P < 0.0001$ ).

**Conclusion.** Black race is an independent predictor of mortality. The impact of race on mortality is mitigated, albeit not eliminated, by increasing hospital volume.

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### 1. Introduction

Endometrial cancer is associated with a favorable prognosis overall, however, significant disparities exist in outcomes between black and white women. Compared to white women, black women are nearly twice as likely to die from their disease (7.9 per 100,000 vs 4.1 per 100,000) [1,2]. The 5-year relative survival rate for white women with uterine cancer is 84%, compared to 62% for black women [3]. Additionally,

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**Table 1**  
Clinical and characteristics of study cohort stratified by hospital volume quartile.

	Total		Hospital volume ≤ 10		Hospital volume 10.01–20		Hospital volume 20.01–60		Hospital volume > 60		P-value
	n	%	n	%	n	%	n	%	n	%	
Number of patients	324,502	(100.0)	40,639	(12.5)	48,981	(15.1)	149,512	(46.1)	85,370	(26.3)	
Number of hospitals	1059	(100.0)	444	(41.9)	246	(23.2)	299	(28.2)	70	(6.6)	
Age of diagnosis											<0.0001
<40	11,348	(3.5)	1391	(3.4)	1706	(3.5)	5250	(3.5)	3001	(3.5)	
40–49	35,148	(10.8)	4752	(11.7)	5500	(11.2)	15,980	(10.7)	8916	(10.4)	
50–59	94,979	(29.3)	11,383	(28.0)	14,186	(29)	43,874	(29.3)	25,536	(29.9)	
60–69	99,200	(30.6)	11,830	(29.1)	14,580	(29.8)	45,930	(30.7)	26,860	(31.5)	
70–79	58,753	(18.1)	7735	(19.0)	9080	(18.5)	27,032	(18.1)	14,906	(17.5)	
≥80	25,074	(7.7)	3548	(8.7)	3929	(8.0)	11,446	(7.7)	6151	(7.2)	
Race											<0.0001
White	243,422	(75.0)	32,349	(79.6)	37,385	(76.3)	108,816	(72.8)	64,872	(76.0)	
Black	27,764	(8.6)	2850	(7.0)	3936	(8.0)	13,956	(9.3)	7022	(8.2)	
Hispanic	16,266	(5.0)	1618	(4.0)	2650	(5.4)	9010	(6.0)	2988	(3.5)	
Other	9918	(3.1)	986	(2.4)	1358	(2.8)	4576	(3.1)	2998	(3.5)	
Unknown	27,132	(8.4)	2836	(7.0)	3652	(7.5)	13,154	(8.8)	7490	(8.8)	
Insurance											<0.0001
Private insurance	167,967	(51.8)	20,140	(49.6)	25,607	(52.3)	77,976	(52.2)	44,244	(51.8)	
Medicaid	14,481	(4.5)	1880	(4.6)	2238	(4.6)	6631	(4.4)	3732	(4.4)	
Medicare	119,474	(36.8)	16,016	(39.4)	17,961	(36.7)	54,813	(36.7)	30,684	(35.9)	
Not insured	11,919	(3.7)	1429	(3.5)	1955	(4)	5712	(3.8)	2823	(3.3)	
Other government	2637	(0.8)	313	(0.8)	313	(0.6)	1336	(0.9)	675	(0.8)	
Unknown	8024	(2.5)	861	(2.1)	907	(1.9)	3044	(2.0)	3212	(3.8)	
Median household income											<0.0001
<\$30,000	39,185	(12.1)	5088	(12.5)	5428	(11.1)	18,649	(12.5)	10,020	(11.7)	
\$30,000–\$35,999	54,517	(16.8)	8081	(19.9)	8259	(16.9)	24,049	(16.1)	14,128	(16.5)	
\$36,000–\$45,999	87,606	(27.0)	11,660	(28.7)	13,885	(28.3)	38,973	(26.1)	23,088	(27.0)	
\$46,000 +	129,889	(40.0)	14,191	(34.9)	19,319	(39.4)	61,864	(41.4)	34,515	(40.4)	
Unknown	13,305	(4.1)	1619	(4.0)	2090	(4.3)	5977	(4.0)	3619	(4.2)	
Patient's residence area											<0.0001
Metropolitan	256,437	(79.0)	29,392	(72.3)	39,949	(81.6)	122,896	(82.2)	64,200	(75.2)	
Urban	48,323	(14.9)	8456	(20.8)	6243	(12.7)	18,743	(12.5)	14,881	(17.4)	
Rural	6329	(2.0)	1052	(2.6)	768	(1.6)	2642	(1.8)	1867	(2.2)	
Unknown	13,413	(4.1)	1739	(4.3)	2021	(4.1)	5231	(3.5)	4422	(5.2)	
Comorbidity score											<0.0001
0	185,128	(57.0)	20,936	(51.5)	27,914	(57.0)	86,309	(57.7)	49,969	(58.5)	
1	48,521	(15.0)	4706	(11.6)	6305	(12.9)	23,312	(15.6)	14,198	(16.6)	
≥2	10,728	(3.3)	1025	(2.5)	1255	(2.6)	5313	(3.6)	3135	(3.7)	
Unknown	80,125	(24.7)	13,972	(34.4)	13,507	(27.6)	34,578	(23.1)	18,068	(21.2)	
Year of diagnosis											<0.0001
1998–2002	80,125	(24.7)	13,972	(34.4)	13,507	(27.6)	34,578	(23.1)	18,068	(21.2)	
2003–2007	105,551	(32.5)	14,067	(34.6)	16,060	(32.8)	47,734	(31.9)	27,690	(32.4)	
2008–2012	138,826	(42.8)	12,600	(31.0)	19,414	(60.4)	67,200	(45.0)	39,612	(46.4)	
Facility location											<0.0001
Eastern	74,469	(22.9)	8811	(21.7)	12,252	(25.0)	30,539	(20.4)	22,867	(26.8)	
South	84,459	(26.0)	8575	(21.1)	12,200	(24.9)	38,392	(25.7)	25,292	(29.6)	
Midwest	111,795	(34.5)	16,537	(40.7)	15,543	(31.7)	51,011	(34.1)	28,704	(33.6)	
West	53,779	(16.6)	6716	(16.5)	8986	(18.3)	29,570	(19.8)	8507	(10.0)	
Facility type											<0.0001
Community cancer program	18,093	(5.6)	13,759	(33.9)	3328	(6.8)	649	(0.4)	357	(0.4)	
Comprehensive community cancer program	172,627	(53.2)	25,308	(62.3)	37,133	(75.8)	81,466	(54.5)	28,720	(33.6)	
Academic program	133,230	(41.1)	1572	(3.9)	8520	(17.4)	67,397	(45.1)	55,741	(65.3)	
Other	552	(0.2)	0	(0.0)	0	(0.0)	0	(0.0)	552	(0.6)	
Histology											<0.0001
Endometrioid	200,698	(61.8)	22,851	(56.2)	28,871	(58.9)	94,098	(62.9)	54,878	(64.3)	
Serous	16,990	(5.2)	1604	(3.9)	2255	(4.6)	8200	(5.5)	4931	(5.8)	
Carcinosarcoma	14,771	(4.6)	1554	(3.8)	2042	(4.2)	6993	(4.7)	4182	(4.9)	
Sarcoma	12,992	(4.0)	1765	(4.3)	2002	(4.1)	5926	(4)	3299	(3.9)	
Clear cell	4251	(1.3)	434	(1.1)	583	(1.2)	2012	(1.3)	1222	(1.4)	
Other	74,800	(23.0)	12,431	(30.6)	13,228	(27.0)	32,283	(21.6)	16,858	(19.8)	
Stage											<0.0001
IA	145,442	(44.8)	16,471	(40.5)	20,485	(41.8)	67,624	(45.2)	40,862	(47.9)	
IB	35,439	(10.9)	4690	(11.5)	5453	(11.1)	16,496	(11)	8800	(10.3)	
I NOS	12,871	(4.0)	1968	(4.8)	2365	(4.8)	5713	(3.8)	2825	(3.3)	
II	19,583	(6.0)	2456	(6.0)	2986	(6.1)	9164	(6.1)	4977	(5.8)	
III	25,256	(7.8)	2712	(6.7)	3528	(7.2)	11,919	(8.0)	7097	(8.3)	
IV	12,655	(3.9)	1290	(3.2)	1711	(3.5)	5971	(4.0)	3683	(4.3)	
Unknown	73,256	(22.6)	11,052	(27.2)	12,453	(25.4)	32,625	(21.8)	17,126	(20.1)	
Grade											<0.0001
Well	127,371	(39.3)	17,439	(42.9)	20,365	(41.6)	57,830	(38.7)	31,737	(37.2)	
Moderate	88,910	(27.4)	11,331	(27.9)	13,160	(26.9)	40,887	(27.3)	23,532	(27.6)	
Poorly	71,141	(21.9)	7693	(18.9)	9908	(20.2)	33,465	(22.4)	20,075	(23.5)	
Unknown	37,080	(11.4)	4176	(10.3)	5548	(11.3)	17,330	(11.6)	10,026	(11.7)	

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