



Racial Differences in Reasons for Failure to Receive Ovarian Cancer Treatment: An Analysis of National Cancer Database Cases (1998 - 2012)

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Abstract

Aim: Non-Hispanic blacks (NHB) have poorer ovarian cancer survival rates than non-Hispanic whites (NHW). This difference is in part due to differences in treatment uptake. The objective of this study is to characterize racial differences in reasons for non-receipt of treatment among women diagnosed with epithelial ovarian cancer (OVCA) in the United States and Puerto Rico between 1998 and 2012.

Methods: NHB and NHW OVCA cases from National Cancer Database (NCDB; n = 173,617) were analyzed to assess differences in reasons for non-receipt of surgery and chemotherapy overall and by stage of cancer (I, II, III, and IV). Reasons for non-receipt of surgery and chemotherapy were characterized according to North American Association of Central Cancer Registries categorizations within NCDB. Chi-square test was used to assess racial differences in demographic and clinical variables. Stage-specific tests of proportions were conducted to examine racial differences for non-receipt of treatment.

Results: Among all women diagnosed, 3,665 (26.2%) of NHB versus 25,805 (16.2%) of NHW failed to receive surgery (< 0.01) and 4,566 (32.7%) of NHB versus 45,139 (28.3%) of NHW failed to receive chemotherapy (< 0.01). NHB were significantly younger in both treatment groups and differed significantly from NHW for each covariate analyzed. Significantly more NHB than NHW (6.7 vs. 4.4, p < 0.05) failed to undergo surgery due to patient, family or guardian refusal. Of those who did not receive chemotherapy, a greater proportion of NHB (4.9 vs. 3.4, p < 0.05) failed to receive chemotherapy as it was contraindicated due to patient risk factors.

Conclusion: Results demonstrate significant racial differences in the reasons for refusal of surgical and chemotherapeutic treatment in OVCA. Reasons for these racial differences should be examined further to better understand and mitigate racial disparities in OVCA treatment and survival.

Keywords: Ovarian cancer treatment, Racial differences, Treatment refusal, Healthcare delivery

Introduction

Cancer survival outcomes are significantly different between non-Hispanic blacks (NHB) and non-Hispanic whites (NHW). The American Cancer Society (ACS) currently reports the cancer death rate among NHB women to be 11% higher than NHW women [1]. Cancer survival disparities may be in part due to treatment differences [2]. Despite mixed results, some consistencies exist in black-white treatment differences for various cancers. African Americans (AA) are more likely to go untreated or receive partial treatment for breast, cervical and lung cancer [3]. African Americans are also less likely to receive chemotherapy for colon cancer (59.3% vs. 70.4%, p < 0.01) [4]. In addition, AA patients are also more likely to refuse recommended therapeutic interventions for pancreatic cancer compared to whites; AA are more likely to refuse surgery (9.0% vs. 3.3%, p = 0.001), refuse chemotherapy (5.6% vs. 2.9%, p = 0.02), and refuse radiation (3.8% vs. 1.6%, p = 0.04) [5]. Similar findings exist in ovarian cancer treatment [6]. NHB are less likely to receive guideline-concordant therapy (35.8% vs. 52.1%) [7]. Additionally, in a meta-analysis of ovarian cancer studies, AA were less likely to receive surgical treatment than whites [8]. Treatment options for ovarian cancer are dependent on many complex, interrelated factors (National Comprehensive Cancer Network, NCCN; NCCN v 2010, v 3.2012), and unique patient treatment options as well as patient cooperation with recommended therapy may vary, leading to different treatment outcomes. The underlying reasons for failure to receive treatment may also vary between persons, contributing to disparities in treatment and survival. The objective of this analysis is to characterize differences in reasons for failure to receive surgery or chemotherapy between NHB and NHW women diagnosed with epithelial ovarian cancer in the United States and Puerto Rico between 1998 and 2012 identified in the National Cancer Data Base (NCDB).

Methods

The study was reviewed by the University of Illinois at Chicago's

Institutional Research Board (IRB) and determined exempt as secondary analysis of de-identified data. Secondary data for women diagnosed with epithelial ovarian cancer from 1998 to 2012 was obtained from NCDB, which is a joint program of the Commission of Cancer (CoC) and the American Cancer Society (ACS) that includes hospital registry data from over 1,500 CoC accredited hospitals and > 70% of cancer cases diagnosed in the U.S. [9]. For the purposes of this study, participants were excluded if diagnosed with non-invasive or non-epithelial tumors. Exclusions also included patients who were younger than 20 years, of unspecified race or of a race other than NHB or NHW, and those with unknown or other governmental health insurance status (which wasn't specified further to appreciate if high or low-quality insurance), leaving a sample size of 173,617. Of these, the sample was further reduced to those who did not receive surgery (n = 29,470; 3,665 NHB and 25,805 NHW which represents 26.2% of NHB and 16.2% of NHW, respectively) and those who did

not receive chemotherapy (n = 49,705; 4,566 NHB and 45,139 NHW which represents 32.7% of NHB and 28.3% of NHW, respectively). Subjects who did not receive surgery and did not chemotherapy were not mutually exclusive but analyses were done individually to capture racial differences in each treatment type.

Demographic and clinical data for women who did not receive surgery or chemotherapy in NCDB was analyzed to assess differences in reasons for failure to receive surgery or chemotherapy. The chi-square test was used to determine if the demographic variables (income, education, primary payor, year of diagnosis, facility type, facility location, urban/rural,) and clinical data (Charlson-Deyo Score, reason for no treatment) differed significantly between NHB and NHW. Stage-specific tests of proportions were conducted to examine racial differences for each reason for non- receipt of surgery or chemotherapy based on North American Association of Central

Table 1: Demographics of subjects who did not receive treatment

	No Surgery, n = 29,470				p value	No Chemotherapy, n = 49,705				p value
	NHW (n = 25,805, 87.6%)		NHB (n = 3665, 12.4%)			NHW (n = 45,139, 90.8%)		NHB (n = 4566, 9.2%)		
Age										
Mean (median)	73.72(76)		68.83(70)			65.60(67)		63.62(65)		
	n	%	n	%		n	%	n	%	
Facility Type					< 0.01					< 0.01
Community Cancer Program	3724	14.4	402	11.0		4537	10.1	451	9.9	
Comprehensive Community Cancer Program	15,540	60.2	1673	45.7		25,855	57.3	2069	45.3	
Academic/Research Program	6510	25.2	1589	43.4		14,712	32.6	2045	44.8	
Other specified types of cancer programs	31	0.03	1	0.0		35	0.1	1	0.0	
Facility Location					< 0.01					< 0.01
New England	1777	6.9	75	2.1		2516	5.6	65	1.4	
Middle Atlantic	4123	16.0	610	16.6		6710	14.9	725	15.9	
South Atlantic	5265	20.4	1258	34.3		9756	21.6	1647	36.1	
East North Central	4632	18.0	603	16.5		7760	17.2	683	15.0	
East South Central	1785	6.9	376	10.3		3000	6.7	489	10.7	
West North Central	1664	6.5	82	2.2		2773	6.1	93	2.0	
West South Central	1839	7.1	422	11.5		3687	8.2	540	11.8	
Mountain	1197	4.6	22	0.6		3148	7.0	55	1.2	
Pacific	3523	13.7	217	5.9		5789	12.8	269	5.9	
Primary Payor					< 0.01					< 0.01
Not Insured	693	2.8	236	6.7		1494	3.4	329	7.6	
Private Insurance	5448	21.7	779	22.0		18,210	42.0	1472	33.8	
Medicaid	838	3.3	384	10.9		1458	3.4	479	11.0	
Medicare	18,080	72.2	2141	60.5		22,208	51.2	2072	47.6	
Zip Code Level Income*					< 0.01					< 0.01
< \$38,000	3979	16.0	1747	49.1		6454	14.8	2049	46.2	
\$38,000 - \$47,999	6253	25.2	795	22.3		10,495	24.1	997	22.5	
\$48,000 - \$67,999	6803	27.4	583	16.4		12,020	27.6	780	17.6	
\$63,000 +	7787	31.4	435	12.2		14,657	33.6	608	13.7	
Zip Code Level Education*					< 0.01					< 0.01
> = 21% or without high-school diploma	3504	14.1	1415	30.8		5906	13.5	1668	37.6	
13-20% without high-school diploma	6558	26.4	1334	37.5		10,957	25.1	1678	37.8	
7-12.9% without high-school diploma	8786	35.4	602	16.9		15,347	35.2	781	17.6	
< 7% or less without high-school diploma	5980	24.1	209	5.9		11,435	26.2	308	6.9	
Charlson-Deyo Score					< 0.01					< 0.01
0	12,699	70.0	1742	65.4		23,229	76.8	2331	72.1	
1	3708	20.5	651	24.4		5183	17.1	671	20.7	
2	1728	9.5	272	10.2		1834	6.1	233	7.2	
Urban/Rural					< 0.01					< 0.01
Urban	23,052	94.4	3433	97.0		40,369	94.4	4276	97.4	
Rural	1357	5.6	108	3.1		2376	5.0	115	2.6	
Year of diagnosis					< 0.01					< 0.01
2008 - 2012	9819	38.1	1536	41.9		14,905	33.0	1669	36.6	
1998 - 2002	7670	29.7	1000	27.3		14,893	33.0	1331	29.2	
2003 - 2007	8316	32.3	1129	30.8		15,341	34.0	1566	34.3	
Reason for no treatment					< 0.01					< 0.01
Not part of planned first course treatment	20,924	81.1	2879	78.6		39,468	87.4	3836	84.0	
Contraindicated due to patient risk factors	2561	9.9	352	9.6		1560	3.5	232	5.1	
Patient died prior to treatment	309	1.2	58	1.6		623	1.4	104	2.3	
Recommended but not performed; no reason recorded	712	2.8	98	2.7		419	0.9	71	1.6	
Refused by patient, family or guardian	1299	5.0	278	7.6		3069	6.8	323	7.1	

Cancer Registries (NAACCR) item categorization. Stage of cancer was analyzed categorically (stage I, II, III, and IV). All analyses were conducted using SAS version 9.4 and statistical significance was set at a p-value < 0.05.

Results

Table 1 presents the demographics of patients who did not receive surgery (NHB, n = 3665, 12.4%; NHW, n = 25,805, 87.6 %) or chemotherapy (NHB, n = 4566, 9.2%; NHW, n = 45,139, 90.8%). NHB were younger in both treatment categories (No Surgery, years: NHB, 68.8; NHW, 73.7; No Chemotherapy, years: NHB, 63.6; NHW, 65.6, both p < 0.01), and differed significantly from NHW for each covariate analyzed (Table 1). Notably, academic/research facilities were more likely to report NHB cases (No Surgery, 43.4% vs. 25.2% and No Chemotherapy, 44.8% vs. 32.6%, both p < 0.01). A greater percentage of NHB had no insurance (No Surgery, 6.7% vs. 2.8% and No Chemotherapy, 7.6% vs. 3.4%) and Medicaid (No Surgery, 10.9% vs. 3.3% and No Chemotherapy, 11.0% vs. 3.4%). In addition, NHB were more likely to reside in areas with a zip code-level income < \$38,000 (No Surgery, 49.1% vs. 16.0% and No Chemotherapy, 46.2% vs. 14.8%, both p < 0.01) and more likely to live in areas where the zip code-level education for non-high school graduates was ≥ 21% (No Surgery, 30.8% vs. 14.1% and No Chemotherapy, 37.6% vs. 13.5%, both p < 0.01).

Stage-specific and overall results are presented in table 2. Among women who did not receive surgery, a significantly higher proportion of NHB (6.7 vs. 4.4, p < 0.01) did not receive surgery due to patient, family or guardian refusal. The proportion of subjects who failed to receive surgery due to patient, family or guardian refusal was consistently higher in NHB across all stages. Of those who did not receive chemotherapy, a greater proportion of NHB (4.9 vs. 3.4, p < 0.01) failed to receive chemotherapy as it was contraindicated due to patient risk factors. The proportion of subjects who failed to receive chemotherapy due to contraindications differed across stages, but was generally higher in NHB than NHW (Table 2).

Discussion

Chemotherapy and surgery are standard treatment options for ovarian cancer and failure to receive treatment is detrimental [10]. Results demonstrate significant differences in the reasons for failure to receive surgery or chemotherapy between NHB and NHW. Our stage-specific results demonstrate a greater percentage of NHB had no

insurance, had Medicaid and were also more likely to reside in areas with zip code-level income < \$38,000. These places NHB in a lower socioeconomic status level and may contribute to these differences in treatment as daily stresses may interfere with their ability to visit hospitals multiple times to complete chemotherapy. Additionally, the type of medical coverage and financial burden from the cost of cancer may dictate their decisions on treatment, resulting in racial differences in non-receipt of treatment. These findings have implications as patient decisions of whether or not to receive surgery and/or chemotherapy create racial differences in ovarian cancer treatment, which may contribute to racial disparities in survival outcomes [2,11]. In comparison to other studies [7,8], these results indicate that NHB are more likely to refuse or have contraindications to cancer therapies. Although reasons for refusal of surgery among NHB are not fully understood, previous studies demonstrate blacks are more likely to express distrust in the health care system and have misconceptions about cancer acquisition and spread [12,13]. In addition, blacks are more likely to resort to spirituality for healing, with the believe that faith and prayer alone can cure cancer [13]. Moreover, AA are more likely to opt for less invasive, less aggressive and less conventional treatments, and are more likely to use alternate cancer treatments [14,15]. Lastly, AA are less likely to believe in the efficacy of treatment options and are more likely to view death as a certain outcome of cancer diagnosis regardless of treatment [14].

Patient-physician relationships factors, which include poor interpersonal communication and strained relationships, which may be due in part to a mixed-race relationship, can affect treatment decisions. Blacks are more likely to report participatory physician communication when racially matched with a physician [13,16].

Results must be taken in context when considering study limitations. Reasons why a patient refused surgery were not included in the registry, nor were the specific patient risk factors contraindicating chemotherapy. Missing data on reasons for no treatment was limited and less than 5% (surgery or chemotherapy was recommended but not performed; no reasons recorded); notably, results were non-differential for surgery (overall; NHB 2.4 vs. NHW 2.5) and chemotherapy (overall; NHB 1.6 vs. NHW 1.0). Strengths of this study include analysis of the NCDB dataset, which is the largest and most comprehensive cancer registry dataset, and inclusive of all cancer cases from CoC-approved hospitals in the U.S. and Puerto Rico, approximating 70% of newly diagnosed cancer cases nationwide [9].

Table 2: Differences in the reasons for failure to receive surgery and chemotherapy by race and stage.

	Overall			Stage 1			Stage 2			Stage 3			Stage 4			Stage Missing		
	NHW	NHB		NHW	NHB		NHW	NHB		NHW	NHB		NHW	NHB		NHW	NHB	
	N (%)	N (%)	p	N (%)	N (%)	p	N (%)	N (%)	p	N (%)	N (%)	p	N (%)	N (%)	p	N (%)	N (%)	p
Reason for No Surgery																		
Not part of planned first course treatment	17,095 (82.1)	2411 (80.2)	0.01	411 (80.0)	51 (63.8)	< 0.01	569 (77.2)	68 (70.1)	0.12	4611 (79.9)	525 (76.2)	0.02	11,504 (83.4)	1767 (82.5)	0.29	3829 (76.2)	468 (71.2)	< 0.01
Contraindicated due to patient factors	2061 (9.9)	281 (9.3)	0.33	41 (8.0)	6 (7.5)	0.88	71 (9.6)	10 (10.3)	0.83	653 (11.3)	78 (11.3)	1.00	1296 (9.4)	187 (8.7)	0.32	500 (10.0)	71 (10.8)	0.53
Patient died prior to surgery	236 (1.1)	45 (1.5)	0.09	5 (1.0)	0 (0.0)	0.38	15 (2.0)	4 (4.1)	0.2	76 (1.3)	11 (1.6)	0.55	140 (1.0)	30 (1.4)	0.11	73 (1.5)	13 (2.0)	0.31
Recommended but not performed; no reason recorded	514 (2.5)	71 (2.4)	0.72	18 (3.5)	4 (5.0)	0.51	31 (4.21)	2 (2.06)	0.31	147 (2.6)	19 (2.8)	0.74	318 (2.3)	46 (2.2)	0.65	198 (4.0)	27 (4.1)	0.86
Refused by patient, family or guardian	908 (4.4)	200 (6.7)	< 0.01	39 (7.6)	19 (23.8)	< 0.01	51 (6.9)	13 (13.4)	0.02	284 (4.9)	56 (8.1)	< 0.01	534 (3.9)	112 (5.2)	< 0.00	391 (7.8)	78 (11.9)	< 0.01
Reason for No Chemotherapy																		
Not part of planned first course treatment	33,856 (87.5)	3178 (84.1)	< 0.01	14386 (94.8)	1108 (95.0)	0.68	2658 (87.1)	224 (82.0)	0.02	8828 (84.6)	724 (78.4)	< 0.01	7984 (79.7)	1122 (79.1)	0.64	5612 (87.05)	658 (83.8)	0.01
Contraindicated due to patient risk factors	1314 (3.4)	186 (4.9)	< 0.01	162 (1.1)	14 (1.2)	0.67	78 (2.6)	14 (5.13)	0.01	420 (4.0)	66 (7.1)	< 0.01	654 (6.5)	92 (6.5)	0.96	246 (3.8)	46 (5.9)	< 0.01
Patient died prior to chemotherapy	540 (1.4)	91 (2.4)	< 0.01	22 (0.1)	1 (0.1)	0.6	23 (0.8)	8 (2.9)	< 0.00	226 (2.2)	38 (4.1)	< 0.01	269 (2.7)	44 (3.1)	0.37	83 (1.3)	13 (1.7)	0.39
Recommended but not performed; no reason recorded	375 (1.0)	60 (1.6)	< 0.01	94 (0.6)	10 (0.9)	0.32a	33 (1.1)	4 (1.5)	0.56	156 (1.5)	18 (1.9)	0.28	92 (0.9)	28 (2.0)	< 0.00	44 (0.7)	11 (1.4)	0.03
Refused by patient, family or guardian	2634 (6.8)	264 (7.0)	0.76	519 (3.4)	33 (2.8)	0.28	259 (8.5)	23 (8.42)	0.97	806 (7.7)	78 (8.4)	0.43	1023 (10.2)	132 (9.3)	0.29	462 (7.2)	57 (7.3)	0.92

Conclusion

Results indicate significant differences in the reasons why NHB and NHW do not receive surgical and chemotherapeutic treatment in a large sample of women with ovarian cancer in the U.S. and Puerto Rico, which may contribute to racial disparities in ovarian cancer treatment and survival. This analysis represents initial work comparing reasons why NHB and NHW cancer patients fail to receive surgery or chemotherapy. Reasons for racial differences in non-receipt of treatment should be further examined to better understand racial disparities in treatment and survival outcomes in ovarian cancer.

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