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Socioeconomic status as a predictor of adherence to treatment guidelines for early-stage ovarian cancer

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HIGHLIGHTS

- Disadvantaged populations experience substandard ovarian cancer care.
- Specifically, lower socioeconomic status is an independent predictor of receiving sub-optimal ovarian cancer treatment that deviates from the NCCN guidelines.
- Adherence to the NCCN guidelines has the potential to improve ovarian cancer survival rates among all populations of women.

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ABSTRACT

Objective. Investigate the impact of socioeconomic status and other demographic variables on adherence to the National Comprehensive Cancer Network ovarian cancer treatment guidelines among patients with stage I/II disease.

Methods. Patients diagnosed with stage I/II epithelial ovarian cancer between 1/1/96–12/31/06 were identified from the California Cancer Registry. Univariate analysis and multivariate logistic regression models were used to evaluate differences in surgical procedures, chemotherapy regimens, and overall adherence to the NCCN guidelines according to increasing SES quintiles (SES-1 to SES-5).

Results. A total of 5445 stage I and II patients were identified. The median age at diagnosis was 54.0 years (range = 18–99 years); 72.5% of patients had stage I disease, while 27.5% had stage II disease. With a median follow-up time of 5 years, the 5-year ovarian cancer-specific survival for all patients was 82.7% (SE = 0.6%). Overall, 23.7% of patients received care that was adherent to the NCCN guidelines. Compared to patients in the highest SES quintile (SES-5), patients in the lowest SES quintile (SES-1) were significantly less likely to receive proper surgery (27.3% vs 47.9%, $p < 0.001$) or chemotherapy (42.4% vs 53.6%, $p < 0.001$). There were statistically significant trends between increasing SES and the likelihood of overall treatment plan adherence to the NCCN guidelines: SES-1 = 16.4%, SES-2 = 19.0%, SES-3 = 22.4%, SES-4 = 24.2% and SES-5 = 31.6% ($p < 0.001$). Multivariate logistic regression analysis revealed that compared to SES-5, decreasing SES was independently predictive of a higher risk of non-standard overall care.

Conclusions. For patients with early-stage ovarian cancer, low SES is a significant and independent predictor of deviation from the NCCN guidelines for surgery, chemotherapy, and overall treatment.

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1. Background

Ovarian cancer remains the most deadly gynecologic cancer in the United States, with approximately 22,000 new cases diagnosed in 2014 and 14,000 related deaths [1]. This high mortality rate is largely linked to the disproportionate percentage of women diagnosed with advanced stage disease. While the Surveillance, Epidemiology, and End Results program (SEER) data estimates a 30% five year survival rate for women with advanced stage disease, women with stage I/II cancer have survival rates of 50–90% when they receive appropriate care. Because early stage disease is often curable, it is especially important that these women receive high quality care. Evidence-based treatment guidelines for early stage ovarian cancer have been put forth by the National Comprehensive Cancer Network (NCCN) and include comprehensive surgical staging followed by either chemotherapy or surveillance based on surgico-pathologic characteristics. These guidelines

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Table 1
Patient, tumor and provider characteristics in study population.

Characteristics	n	%
Total	5445	100
Race		
White	3540	65.0
African American	211	3.9
Hispanic	903	16.6
Asian/Pacific Islander	791	14.5
Insurance		
Managed care	2932	53.9
Medicare	1061	19.5
Medicaid	454	8.3
Other ins	800	14.7
Not insured	198	3.6
SES		
Lowest SES	671	12.3
Lower-middle SES	996	18.3
Middle SES	1190	21.9
Higher-middle SES	1267	23.3
Highest SES	1321	24.3
Age		
<45	1284	23.6
45–54	1483	27.2
55–69	1527	28.0
≥70	1151	21.1
Stage		
I	3947	72.5
II	1498	27.5
Grade		
Grade I	1007	18.5
Grade II	1387	25.5
Grade III	1272	23.4
Grade IV	355	6.5
Grade not stated	1424	26.2
Histology		
Serous	1188	21.8
Mucinous	806	14.8
Endometrioid	1314	24.1
Clear cell	625	11.5
Adenocarcinoma, NOS	281	5.2
Other	1231	22.6
Tumor size		
≤5 cm	805	14.8
5–10 cm	1090	20.0
>10 cm	1845	33.9
Unknown	1705	31.3
Hospital volume		
High volume	977	17.9
Low volume	4468	82.1
Hospital type		
ACoS approved	1778	32.7
Not ACoS approved	2192	40.3
Unknown	1475	27.1
Physician volume		
High	869	16.0
Low	3480	63.9
Physician unknown	1096	20.1
Hospital volume and physician volume		
High volume hospital & high volume physician	226	4.2
High volume hospital & low volume physician	489	9.0
Low volume hospital & high volume physician	643	11.8
Low volume hospital & low volume physician	2991	54.9
High volume hospital & unknown volume physician	262	4.8
Low volume hospital & unknown volume physician	834	15.3
Surgery type		
1 = no surgery	254	4.7
2 = removal of ovary ± hysterectomy	2035	37.4
3 = oophorectomy with omentectomy	2666	49.0
4 = Debulking	490	9.0
Lymph node biopsy		
Had biopsy	2865	52.6
No biopsy	2580	47.4
Surgery and lymph node biopsy		
1 = no surgery, no biopsy	254	4.7
2 = oophorectomy ± hysterectomy, had biopsy	838	15.4
3 = oophorectomy ± hysterectomy, no biopsy	1197	22.0
4 = oophorectomy with omentectomy (or debulking), had biopsy	2027	37.2
5 = oophorectomy with omentectomy (or debulking), no biopsy	1129	20.7
Chemo type		
1 = No chemo − other reason	2538	46.6
2 = Recommended, but no chemo	360	6.6
3 = Had chemo, not multiple agent	303	5.6
4 = Had chemo-multiple agent	2244	41.2
Treatment sequence		
0 = No trt	153	2.8
1 = Only surgery	2736	50.3
2 = Only chemo	91	1.7
3 = Both surgery and chemo, unknown date	57	1.1
4 = surgery + neoadjuvant chemotherapy	2340	43.0
5 = neoadjuvant chemotherapy + surgery	68	1.3
Treatment plan adherence		
Adherence	1288	23.7
Non-adherence	4157	76.4

have been validated as correlating with improved disease-specific survival and can be considered a process measure of high-quality cancer care [2].

Despite standardized treatment guidelines, socio-demographic disparities in ovarian cancer survival have been well documented [3–5]. Lower survival rates have been associated with low socioeconomic status (SES), Black race, publicly funded insurance, and lack of insurance [4]. Given these disparities in survival rates, much work has been directed at identifying potentially modifiable variables that determine the quality of care received. Disparities exist in all aspects of ovarian cancer care from access to general gynecologic care to obtaining a diagnosis to receiving comprehensive treatment. The objective of the current study was to investigate the impact of SES, and other demographic variables, on adherence to NCCN ovarian cancer treatment guidelines among patients with stage I/II disease.

2. Methods

This was a retrospective population-based study of stages I and II invasive epithelial ovarian cancer cases reported to the California Cancer Registry (CCR) between January 1, 1996 and December 31, 2006 and received exempt status by the Institutional Review Board of the University of California, Irvine (HS#2011-8317). CCR case reporting is estimated to be 99% for the entire state of California, with follow-up completion rates exceeding 95% [6]. The International Classification of Disease Codes for Oncology (ICD-O) based on the World Health Organization criteria were used for tumor location and histology. Cases were identified using ovarian SEER primary site code (C569).

The study population included women who were older than 18 and diagnosed with first or only invasive epithelial ovarian cancer. A total of 21,044 incident ovarian cancer cases were identified with follow-up through January 2008. Of these, 5445 cases of stage I or II invasive epithelial ovarian cancer were included as the final study population after excluding 13,178 cases with stage III or IV disease, 2030 with incomplete staging information, 179 cases with borderline, germ cell, sex cord–stromal tumors or missing ICD-O-2 morphology code, 69 cases that were prepared from autopsy or death certificate only or had unknown surgery and/or chemotherapy information, 132 with incomplete clinical information and 11 with incomplete hospital information.

Explanatory variables included patient, tumor and health care provider characteristics. Race/ethnicity of the patient was categorized into four groups: White, Black, Hispanic and Asian/Pacific Islander. Insurance type was grouped into five categories: Managed care (managed care, HMO, PPO or private insurance), Medicaid, Medicare, other insurance type and not insured. Socioeconomic Status (SES) was classified into five quintiles, lowest (SES-1), lower-middle (SES-2), middle (SES-3), higher-middle (SES-4) and highest (SES-5) based on the Yost score. The Yost score is a composite index of socioeconomic status contained