Exploring Predictors of Palliative Care Referral in Advanced Ovarian Cancer: A Socioecological Approach

Susie Cho, PhD, RN, AG-NP[1], Donna L. Berry, PhD, RN, AOCN, FAAN[2]

[1]Seattle University, College of Nursing, Seattle, WA, USA; [2]University of Washington, School of Nursing, Seattle, WA, USA

BACKGROUND

- **Early palliative care (PC) integration** improves quality of life, mood[1-3], prognostic understanding[4], and survival rates[2,5] in patients with advanced cancer, yet referrals often occur late despite recommendations from national and international health organizations.
- **Referral triggers using** patient-reported outcomes (PROs) can support earlier and more systematic PC referrals, but these are rarely studied in ambulatory gynecologic oncology.
- In **advanced ovarian cancer,** patients frequently experience high symptom burden, repeated recurrence, and complex decision-making needs—making them especially vulnerable to **undertreatment of distress and late PC referral.**
- This study examines how real-time PROs and demographic factors relate to PC referral in women with advanced ovarian cancer, aiming to inform timely, patient-centered care.

METHODS

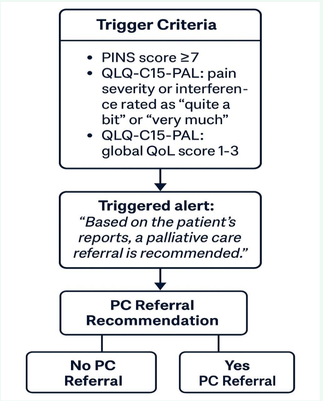

Figure 1. Study PC referral pathway

Figure 2. Provider report with trigger statement

Study Design, Sample, and Setting

- Secondary analysis of longitudinal data from the *electronic Self-Assessment and Care (eSAC)* study—a non-randomized, pre-post study evaluating a digital self-report system for symptom and QoL monitoring. Participants were **women with stage III/IV or recurrent ovarian cancer** receiving care at the University of Washington Gynecologic Oncology Clinic (Sept 2020–Feb 2022). Participants completed an online symptom and QoL assessments (eSAC) 5 days prior to each clinic visit.

eSAC Symptom Monitoring System

- Internet-based tool prompted self-reporting of: Pain (0–10 Pain Intensity Numerical Scale [PINS]); EORTC QLQ-C15-PAL (15-item palliative care quality of life tool); Decisional control preferences and basic demographic information.

Statistical Analysis (R version 4.1.1)

- Chi-squared/Fisher's exact tests compared baseline characteristics by PC referral status.
- Mean PRO scores calculated per participant across repeated assessments (PRO scores transformed to 0–100 scales; higher = better function/worse symptoms) and t-tests compared PROs between groups (PC referral vs. no PC referral).
- Logistic regression models assessed associations between PROs and PC referral, including demographic interaction terms included to mainly examine the differential effect of PROs on the likelihood of a PC referral order between dichotomous demographic groups.

Conceptual Framework

- The **Socioecological Model by Bronfenbrenner**[6] was used to guide the analysis of PC referral decisions.

RESULTS

Table 1. Sample Characteristics (N = 116)

	No PC Referral N (%)	PC Referral N (%)
Age group (years)		
30-49	9 (10%)	3 (13%)
50 or above	84 (90%)	20 (87%)
Race		
Asian	5 (6%)	3 (14%)
Black or African-American	1 (1%)	0
Native Hawaiian or other Pacific Islander	1 (1%)	0
White/Caucasian	80 (92%)	19 (86%)
Ethnicity		
Hispanic	3 (3%)	2 (9%)
Non-Hispanic	90 (97%)	21 (91%)
Education		
< 4-year college	27 (30%)	6 (28%)
4-year college	32 (36%)	8 (36%)
Graduate degree	30 (34%)	8 (36%)
Marital status		
Single or Separated	29 (31%)	5 (22%)
Married/Partnered	64 (69%)	18 (78%)
Received PC trigger		
No	33 (36%)	6 (26%)
Yes	60 (64%)	17 (74%)

Note: Significance levels: p<0.1; **p<0.05; ***p<0.01
Due to homogeneity of the sample and to avoid misinterpretation of small demographic subgroups, age, employment status, education and relationship status were selected for the final analysis.

Table 2. Patient Reported Outcomes by PC referral status (N = 116)

	No PC Referral mean (SD)	PC Referral mean (SD)
PINS	3.09 (1.65)	3.41 (1.89)
Physical Functioning*	86.34 (14.54)	78.62 (17.36)
Emotional Functioning	79.44 (16.84)	71.49 (25.93)
Symptoms		
Fatigue**	34.46 (19.74)	47.18 (21.76)
Pain	26.47 (18.44)	30.29 (19.01)
Nausea/Vomiting	15.69 (16.13)	23.67 (23.12)
Dyspnea	19.18 (18.51)	20.63 (25.45)
Insomnia	32.37 (17.63)	30.40 (22.10)
Appetite Loss***	14.98 (16.09)	36.49 (28.14)
Constipation	17.53 (18.22)	25.98 (18.78)
Quality of Life	69.26 (14.73)	62.29 (18.33)

Note: Significance levels: p<0.1; **p<0.05; ***p<0.01

Table 3. Factors predicting PC referral orders

	Model 1	Model 2	Model 3
	OR (95% CI)		
Age (age 49 and younger)	1.878 (0.642, 6.400)		2.358 (0.615, 11.004)
Work (non-working)	0.985 (0.198, 3.839)		2.075 (0.331, 11.550)
Education (college degree and less)	1.119 (0.395, 3.015)		0.758 (0.199, 2.589)
Relationship status (single/separated)	1.623 (0.566, 5.409)		0.707 (0.173, 3.033)
PINS		1.014 (0.600, 1.691)	1.005 (0.560, 1.782)
Physical functioning		0.963 (0.909, 1.018)	0.972 (0.912, 1.035)
Emotional functioning		0.987 (0.951, 1.023)	0.982 (0.943, 1.020)
Fatigue		1.011 (0.964, 1.060)	1.026 (0.974, 1.083)
Pain		0.975 (0.925, 1.027)	0.963 (0.915, 1.024)
Nausea/Vomiting		1.021 (0.977, 1.066)	1.026 (0.978, 1.077)
Dyspnea		0.972 (0.936, 1.006)	0.963 (0.922, 1.001)*
Insomnia		0.970 (0.935, 1.005)	0.968 (0.931, 1.004)*
Appetite loss		**1.044 (1.011, 1.083)*** **	**1.044 (1.010, 1.084)****
Constipation		1.019 (0.987, 1.051)	1.017 (0.985, 1.050)
Quality of life		1.055 (0.951, 1.068)	1.007 (0.948, 1.073)

Note: The reference group for each variable is indicated in parentheses.
Significance levels: p<0.1; **p<0.05; ***p<0.01

Figure 3. The effect of symptoms on the likelihood of PC referral orders by demographic groups (Bar plots of Odds ratio (OR) and 95% confidence interval (CI) for each symptom: A) Appetite loss, B) Insomnia, and C) Quality of Life).*

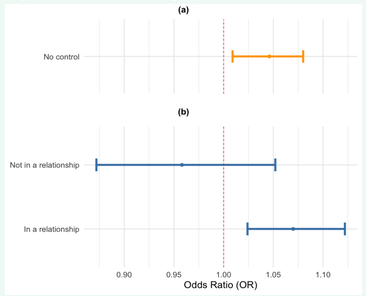

Figure A - (a) shows that appetite loss was significantly associated with the likelihood of receiving a palliative care (PC) referral order (OR = 1.05, 95% CI = [1.01–1.08]).

Figure A - (b) compares relationship status, showing that individuals in a relationship had significantly higher odds of receiving a PC referral order (OR = 1.07, 95% CI =[1.02–1.12]), while those not in a relationship did not differ significantly (OR = 0.96, 95% = CI [0.87–1.05]).

Figure A. Group differences in the likelihood of receiving PC referral order with **appetite loss**. Figure A-(a) uncontrolled; Figure A-(b) controlled for relationship status

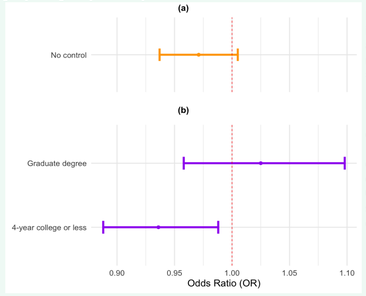

Figure B - (a) shows that insomnia was not significantly associated with the likelihood of receiving a PC referral order (OR = 0.97, 95% CI = [0.94–1.01]).

Figure B - (b) indicates Individuals with a graduate degree had higher odds (OR = 1.03, 95% CI = [0.96–1.10]) compared to those with a 4-year college degree or less (OR = 0.94, 95% CI = [0.89–0.99]) stating a significant interaction effect.

Figure B. Group differences in the likelihood of receiving PC referral order with **insomnia**. Figure B-(a) uncontrolled; Figure B-(b) controlled for education status

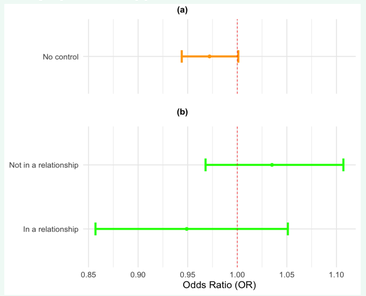

Figure C - (a) shows that QoL was not significantly associated with the likelihood of receiving a PC referral order (OR = 0.97, 95% CI = [0.94–1.00]).

On the contrary, **Figure C - (b)** Relationship status significantly modified the association between QoL and the likelihood of receiving a PC referral order. Compared to individuals not in a relationship (OR = 1.04, 95% CI = [0.97–1.11]), those in a relationship had lower odds (OR = 0.95, 95% CI = [0.86–1.05]).

Figure C. Group differences in the likelihood of receiving PC referral order with **quality of life**. Figure C-(a) uncontrolled; Figure C-(b) controlled for relationship status

*The report only includes demographic groups that show statistically significant interactions with each symptom.

CONCLUSIONS

- **Exploratory analysis** revealed how patient-reported outcomes (PROs), in combination with demographic factors, may influence the likelihood of receiving a palliative care (PC) referral order in women with advanced ovarian cancer.
- **Pain** alone was not a significant predictor of PC referral, despite being a commonly reported and burdensome symptom in advanced cancer patients.
- **Loss of appetite** emerged as a significant symptom associated with increased PC referrals, particularly among participants in a relationship—suggesting caregiver dynamics may influence care decisions.
- **Relationship status and QoL** showed a meaningful interaction, underscoring the importance of assessing social context in symptom evaluation and referral practices.

CLINICAL IMPLICATIONS

- PC referral should not rely solely on symptom or QoL screening scores. Instead, concerning findings—whether identified through screening or patient report—should prompt clinician-patient dialogue to assess the need for supportive care.
- A comprehensive understanding of the factors impacting PC referral orders will potentially assist in normalizing the PC referral process in the best way possible.
- Findings also offer valuable insights for the development of Artificial Intelligence (AI) models in PC such as algorithms that integrate PROs with socioecological and demographic data may more accurately identify patients who would benefit from timely PC referrals while supporting more equitable and context-sensitive decision-making.

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For more information, contact Susie Cho (css0904@gmail.com)