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Introduction

Gynecologic malignancies still account for approximately 28,080 deaths in the United States in 2013 [1]. Ovarian cancer contributes to the majority of deaths with a projected 14,030 [1]. Given these statistics, a key role of the gynecologic oncologist is that of a physician who cares for patients at the end of life (EOL). e utilization of hospice care in the United States in oncologic patients has more than doubled from 540,000 in 1998 to 1,300,000 in 2006 according to the American Society of Clinical Oncology [2]. is may be re ective of the society's endorsement of the early use of palliative care services with advanced or symptomatic disease [3]. With this trend, more literature has been dedicated to discussing hospice care in the gynecological oncology patient population [4-12]. e goal of hospice is to provide compassionate, holistic care for patients and their families and to maximize quality of life through a variety of methods [13].

A retrospective study by Keyser et al. found that gynecologic oncology patients who were not enrolled in hospice at the end of life were more than two times more likely to have medical or surgical interventions for symptomatic relief or to prolong life performed within four weeks of their death [8]. Despite these ndings, a large part of palliative care involves invasive procedures ranging anywhere from 30-60% in this patient population [4,8]. Common invasive procedures in the gynecologic oncologic patient population include paracentesis, thoracentesis, gastric tube placement, catheter and drain placements and even major surgery for the purposes of symptomatic relief [4]. Physicians struggle with an ongoing dilemma regarding the futility of certain aspects of care, particularly continuing invasive interventions [4]. Despite this important question, there is limited data that addresses the issue of preforming interventions on hospice patients and the impact this may cause. e literature remains inconclusive regarding the bene t of invasive procedures on symptomatic control, quality of life and overall survival.

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determine the date of death.

Clinical data extracted included disease site and stage, clinical course of admission and reason for admission, hospice type chosen, treatment with palliative chemotherapy or radiation in the 8 weeks prior tohospice referral and hospital readmissions. When there were multiple indications for admission, the primary indication was determined based on the patient's clinical documentation.The number and type of invasive procedures performed in the 4 weeks before referral including those at the time of inpatient hospitalization were recorded. Invasive procedures were de ned as any procedure requiring local or systemic anesthesia. ese included laparotomy, ostomy, percutaneous nephrostomy tube placement, gastric tube placement, paracentesis, thoracentesis, radiology guided biopsies and drains, port-placements and embolizations. e procedure (PRO) and non-procedure (NOPRO) groups were compared.

Statistical methods

Cox regression modeling was used to explore the association of selected covariates of interest on the time-to-event outcome of overall survival (OS). Overall survival for this study has been de ned as the time from the date hospice discharge to death from any cause. For models of interest, relevant hazard ratios (HR) with their 95% con dence intervals have been given.

An approximation to Bayes factors, known as the Schwartz Bayesian Criteria (SBC), was used to assess the strength of evidence of association for each covariate of interest on the time-to event function of OS [8,9]. e SBC, in the form of a 'di erence measure', may be much more useful than a 'traditional' interpretation of a 'p-value < 0.05' for two main reasons. e rst is that using the di erence in SBCs can give information in support of the null hypothesis. e second is that the di erence in SBCs may be more 'interpretable' in either very large or very small sample sizes (where an alpha level of 0.05 has less

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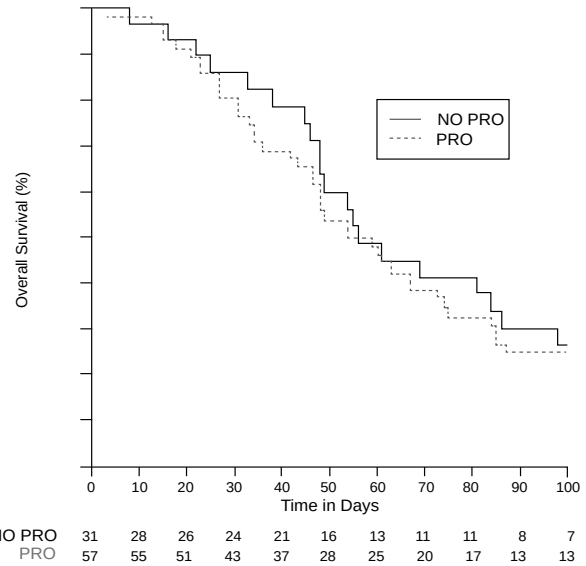

PRO: Had a procedure 4 weeks prior to hospice referral; NOPRO: Did not have a procedure within 4 weeks prior to hospice referral
Figure 1: Overall Survival PRO vs NOPRO

Types	1
Percutaneous nephrostomy tubes	8
Gastric tube	22
Laparotomy	12
Ostomy	4
Paracentesis	9
Thoracentesis	5
Radiology guided drain placement	14
Port placement	1
Embolization	3
Other	7
*Performed 4 weeks prior to hospice referral	

Table 2: Invasive procedure.

	PRO N=57 (%)	NOPRO N=31 (%)	P-Value
Palliative Chemotherapy given			
Yes*	52 (91.3)	26 (83)	0.48
No	5 (8.7)	5 (17)	
Radiation given			
Yes	5 (8.7)	5 (16.1)	0.31
No	52 (91.3)	26 (83.9)	
Hospice type			
Inpatient	12 (21)	7 (22.5)	0.87
Home	45 (79)	24 (77.5)	
Hospital readmissions			
Yes	6 (10.5)	3 (9.3)	1.0
No	51 (89.5)	28 (90.7)	
Overall survival (d)	0.31		

Unlike previous literature, this studyfocuses solely on patients referred to hospice in order to understand whether procedural interventions a ect their overall survival and secondary outcomes. To our knowledge there has not been a study to compare the impact of procedures on survival or disposition amongnewly referred hospice patients that have or have not received invasive procedures in the 4 weeks prior to hospice enrollmen Our patients most commonly received 1-2 procedures. e most frequent procedures were gastrostomy tube placement, image-guided drain placement, or surgery. is is consistent with previous literature [4,8].

In this study, patients were able to receive palliative radiation and/or chemotherapy in both the PRO and NOPRO groups. is information may be reassuring to practitioners that might feel that having procedures performed may delay these palliative treatments. In addition, patients in the PRO group were not more likely than the NON-PRO group to be admitted toinpatient hospice care. e decision to enter home versus hospital-based hospice was likely more dependent on other external factors not evaluated in this study. Lastly, overall survival was not signi cantly di erent between the groups at 56d in the PRO group vs 54d in the NONPRO group (p=0.71).

ere are several ways to interpret this data. First, procedures do not appear to prolong or shorten overall survival in the terminal stages of gynecologic cancer. One could argue that these interventions may be improving the quality of life for our hospice patients, but this data was not collected in this study. Intuitively, some more minor procedures such as paracenteses to relieve pressure from ascitic uid or an ostomy to relieve the symptoms of a small bowel obstruction could be helpful in contrast to larger more invasive procedures. would be an important focus of future research to determine if our interventions are helpfulA comparison of minor versus major procedures could also be helpful.

Our study is limited by sample size and its retrospective nature. We did not have the ability to collect quality of life data. We know that procedures do not a ect the choice between inpatient versus outpatient hospice, but we do not have additional information on the patient's decision-making process. ough di cult to perform, acontinuous prospective collection of patient centered outcomes data focusing on quality of life and survival in this setting would further develop our understanding of the impact of invasive procedures and palliative treatment with either chemotherapy or radiation towards the EOL. e decision for performing invasive procedures should be made based on a case by case basis, taking into account the individual patient's symptoms and goals of care.

Essential points

Invasive procedures during hospice care did not adversely a ect palliative treatment delivery, hospital re-admission rate, home vs. inpatient hospice decision or overall survival.

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