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Comparison of First Diagnosis to Surgery Interval for Patients with Endometrial Cancer; Centralized Managed Care Health System versus Community Hospital System with Heterogenous Payer Mix

Natalie Shammas M.D.*[1], Henry Zheng B.S.[2], Melissa Hodeib D.O.[3], Eijean Wu M.D.[4], Alireza Abidi M.D. [5], Robert Bristow M.D.[5]

1. Adventist Health White Memorial Medical Center, Los Angeles, CA, USA; Obstetrics and Gynecology

2. University of California Los Angeles, Los Angeles, CA, USA; Department of Medical Informatics

3. Kaiser Permanente Riverside Medical Center, Riverside, CA, USA; Department of Gynecologic Oncology

4. Adventist Health White Memorial Medical Center, Los Angeles, CA, USA; Department of Gynecologic Oncology

5. University of California Irvine, Irvine, CA, USA; Department of Gynecologic Oncology.

Corresponding Author: Natalie Shammas, MD, Adventist Health White Memorial Medical Center Obstetrics and Gynecology, 1720 East Cesar E Chavez Avenue, Los Angeles, CA 90033.

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Abstract

Objective. *To determine whether a statistically significant or clinically meaningful difference exists in the time interval from endometrial cancer diagnosis to surgery between a centralized managed care health system and a community hospital system with heterogenous payer mix.*

Data Sources and Study Stetting. *This was a retrospective, consecutive, population-based case series of patients with endometrial cancer diagnosed between 1/1/2017 and 12/31/2021 at Kaiser Permanente Riverside Medical Center (KP) and Adventist Health White Memorial Medical Center (AHWM). KP is a centralized managed care health system whereas AHWM is a community hospital system with a heterogenous payer mix.*

Study Design and Data Collection. *Patients diagnosed with endometrial cancer that underwent primary surgery during the timeframe were included in the study. Subjects that underwent surgery were identified from the hospital operative case registry; their medical charts were reviewed to confirm the pathological diagnosis and obtain data on date of endometrial biopsy, first gynecologic oncology visit, and surgery. Sixty-eight patients were diagnosed with endometrial cancer in the community hospital system and 176 patients were diagnosed in the centralized managed care health system.*

Principal Findings. *The centralized managed care health system offered a significantly shorter time interval, reported in number of days, for two outcomes: shorter time interval from diagnosis (biopsy) to primary surgery (37.45 days), and time interval from first Gynecology Oncology consultation to surgery (33.28 days). Age, race, and health plan were controlled for with multivariate regression for all statistical analyses. Among the two systems, the majority (69.3%) of patients had FIGO Stage IA disease, endometrioid (80%) histology, and obesity (69.7%). Remaining demographic data can be found in Table 1.*

Conclusion. *Patients with endometrial cancer in a centralized managed care health system experienced a shorter interval from cancer diagnosis to surgery compared to patients in a community hospital system with heterogenous payer mix.*

Keywords: *Obstetrics and Gynecology; Health Care Organizations and Systems; Health Care Financing/Insurance/Premiums; Surgery*

Introduction

Endometrial adenocarcinoma is the most common gynecologic malignancy in the United States. In the United States alone, there were an estimated 65,950 new cases and 12,550 deaths from endometrial cancer in 2022 [1]. Timely access to care is a known quality metric for cancer patients[2]. Specifically for patients with endometrial cancer, a six-week time point has been used as a benchmark wait time for surgical treatment3. Some studies report adverse survival outcomes for patients with surgical wait times greater than six to twelve weeks[3,4].

In addition to timely surgical management, recent attention has focused on the delivery of quality and timely care from a systems level perspective. The American health system is largely decentralized, using an array of private and public insurance entities to cover healthcare to the population. The western United States has a unique payor that centralizes its services, amidst a landscape of hospital systems with a heterogenous payer mix [5]. This payor, Kaiser Permanente, serves its members through a unique business model that combines health care delivery into a streamlined, coordinated experience. In California, these medical centers offer most service in a single setting: laboratory, surgery, radiology pharmacy, hospital and outpatient cares [5]. This encourages patient compliance and enhances opportunities for primary care physicians and specialists to provide coordinated, timely care. This is unlike systems with heterogeneous payer mix that require referrals outside of a single system. Studies specific to Gynecologic Oncology have corroborated these findings: they found improvements in outcomes with centralization of Gynecologic Oncology services and attributed this success to quicker and easier access to specialty care and multidisciplinary team management6. Clinicians in a centralized managed care health system noted improved timeliness of information transfer and coordination of mechanisms to verify efficacious handoffs [5]. Thus, the objective of the current study was to determine whether there is a statistically significant difference in the time interval between endometrial cancer diagnosis and surgical intervention among a centralized managed care health system and a community hospital system with heterogenous payer mix.

Materials and Methods

Data Collection

The current study was a retrospective, consecutive, population-based case series of patients with endometrial cancer diagnosed between 1/1/2017 and 12/31/2021 at Kaiser Permanente Riverside Medical Center and Adventist Health White Memorial Medical Center. Kaiser Permanente is a

centralized managed care health system whereas Adventist Health White Memorial is a community hospital system with a heterogenous payer mix. Patients diagnosed with endometrial cancer that subsequently underwent primary surgery during the timeframe were included in the study. All cases were identified from institutional operative case registries for endometrial cancer and hysterectomies. Subjects that underwent primary surgery for endometrial cancer were identified from the hospital surgical case registry; chart review was conducted to then confirm the pathological diagnosis and obtain the following data points: date of endometrial biopsy, first gynecologic oncology visit, and primary surgery. Other data points collected include age, race, tumor grade, tumor stage, presence of LVSI, adjuvant treatment, health plan, recurrence, BMI, and vital statistic. Exclusion criteria included patients who did not undergo primary surgery.

Statistical Analysis

The primary dependent variable was time between diagnosis (biopsy) and definitive primary surgery and secondary dependent variables were time intervals from diagnosis (biopsy) to initial Gynecology Oncology consultation, and initial consultation to definitive primary surgery. To check for confounding, multivariate regression was performed on tumor grade, recurrence, health plan, FIGO stage and race. None of these covariates were significantly different between health systems for time intervals from diagnosis to initial consultation, diagnosis to primary surgery or for initial consultation to surgery. Further, pairwise regressions were performed to compare grade, recurrence, health plan, FIGO stage, and race. Two-sample t-tests were conducted to compare time intervals diagnosis to initial consultation, diagnosis to primary surgery or for initial consultation to surgery between the centralized managed health care system and community hospital system with heterogenous payer mix. To ensure each system had similar FIGO stage makeup, chi-squared tests of independence were completed comparing healthcare system to FIGO stage and healthcare system to recurrence. Power calculations were performed for estimating sample size needed for overall survival difference given observed. These calculations were assessed using the R software program and tested to the 5% significance level.

Results

All patients in this study were diagnosed with endometrial cancer within the prespecified period. The patients were identified from two different healthcare models: Kaiser Permanente (KP), a centralized managed care health system and Adventist Health White Memorial Medical Center (AHWM), a

community hospital system with heterogenous payer mix. The majority (69.3%) of patients had FIGO Stage IA disease, endometrioid (80%) histology, and obesity (69.7%). More than half (72.1%) of the patients received care within the centralized managed care model, whereas 27.9% received care within the community hospital system. Within the centralized managed care system, all patients had HMO health plans; in contrast, in the community hospital system, 45% of patients were covered by Medical, 29% by Medicare, and 24% by HMO or PPO health plans (Table 1).

Between 1/1/2017 and 12/31/2021, 68 (27.9%) patients were diagnosed with and treated for endometrial cancer at AHWM and 176 (72.1%) patients were diagnosed and treated at KP. Table 1 illustrates the patient demographics and tumor characteristics. Drawing on GOG-99, age cutoffs were established as <50, between 50 to 70 and >70 years old.7 The cohort was racially/ethnically diverse. Of the patients treated at AHWM, 64.7% (44/68) identified as Latinx, 26.5% (18/68) as White, 2.9% (2/44) as Black, 2.9% (2/44) as Other, and 2.9% (2/44) as Asian. At KP, 25% (44/176) patients identified as Latinx, 59.7% (105/176) as White, 8.5% (15/176) as Black, 0% (0/176) as other, 6.8% (12/176) as Asian (Table 1).

Age, race, and health plan were controlled for with multivariate regression the following statistical analyses. Two-sample t-tests were performed to examine these three outcomes which demonstrated that the KP health system offered statistically insignificant shorter time interval by 4.17 days (p=0.77, 95% CI: **[**-24.61, 32.94**]**) for biopsy to consultation, a significantly shorter time interval from biopsy to surgical intervention by 37.45 days (p=3.3*10-3, 95% CI: **[**12.23, 62.66**]**), and significantly shorter time interval from first consultation to primary surgery by 33.28 days (p=7.3*10-3, 95% CI: **[** 8.68, 57.89**]**). Unadjusted mean time intervals for the three outcomes were as follows: number of days from biopsy to first Gynecologic Oncology consultation in the community hospital system was 12.06 days and 20.10 days at the centralized manage care system. Mean number of days from biopsy to surgery in the community system was 78.76 days and 45.05 days in the centralized managed care system. Lastly, mean number of days from first consultation to primary surgery in the community hospital system was 66.71 days and 24.95 days in the centralized managed care system.

Chi squared analysis revealed no significant difference in recurrence rates (p=0.51) or death rates (p=0.80) between the two systems. Covariate analysis showed that grade (p>0.18), recurrence (p>0.52) and race (p>0.59) had no confounding effect on the time intervals for biopsy to first consultation, biopsy-to-surgery, or first consultation to surgery between the two systems. Age was weakly negatively related the time interval from biopsy to primary surgery (p=0.023) but was not recapitulated in the time interval from first consultation to primary surgery (p = 0.51). There was no difference in

the time interval from biopsy to primary surgery (p=0.45) or initial Gynecology Oncology consultation to primary surgery (p=0.47) due to insurance type seen in the community hospital system. An equivalent comparison among the patients at KP could not be performed given these patients were under the same payer system.

Table 1: Patient Demographics and Tumor Characteristics		
FIGO Pathologic Stage	EIN	2 (0.8%)
	Stage IA	169 (69.3%)
	Stage IB	32 (13.1%)
	Stage II	14 (5.7%)
	Stage III	22 (9%)
	Stage IV	5 (2%)
Tumor Histology	Endometrioid	195 (80%)
	Serous	15 (6.1%)
	Clear Cell	3 (1.2%)
	Carcinosarcoma	14 (5.7%)
	Mixed	13 (5.3%)
	Unknown	4 (1.6%)
Health Plan	Medicare	21 (8.6%)
	Medical	29 (11.8%)
	HMO	176 (72.1%)
	PPO	16 (6.6%)
	Uninsured	2 (0.8%)
Age at Diagnosis	< 50	36 (14.8%)
	50 - 70	170 (69.7%)
	> 70	38 (15.6%)
Race	White	123 (50.4%)
	Black	17 (7%)
	Asian	14 (5.7%)
	Latinx	88 (36%)
	Other	2 (0.8%)
BMI	<18.5	0 (0%)
	18.5 to 24	25 (10.2%)
	25 to 29	49 (20.1%)
	30 to 34	52 (21.3%)
	35 to 39	58 (23.8%)
	>40	60 (24.6%)
Healthcare System	Centralized	176 (72.1%)
	Community	68 (27.9%)

Table 1. Describes the demographic, pathologic and histologic makeup of both cohorts.

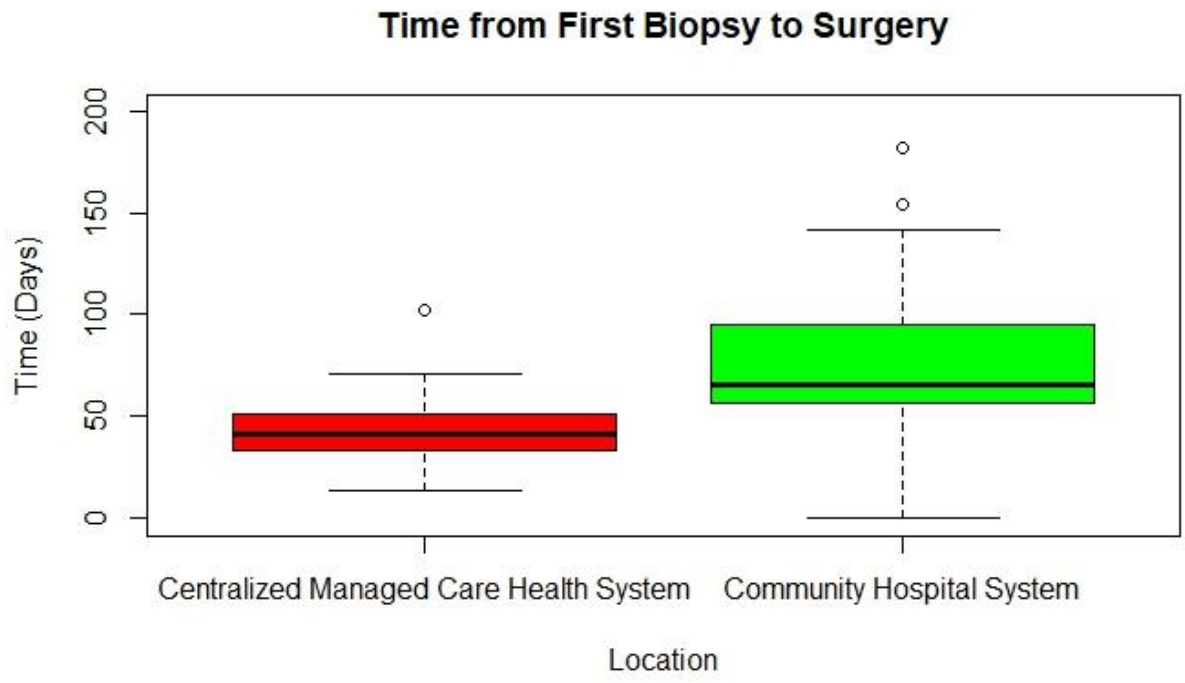

Figure 1. Demonstrates a significant difference in time interval from biopsy to surgery between a Centralized Managed Care Health System and Community Hospital System with heterogenous payer mix.

Discussion

Delivering quality and timely healthcare is an important quality metric that has been explored in recent literature **[**2**]**. Timely access to care leads to better patient outcomes, increased compliance, and satisfaction. Controversy exists regarding whether survival outcomes are altered with delayed surgical intervention for patients with endometrial cancer **[**3,4,8,9**]**. Several studies have showed decreased survival outcomes for patients with delayed surgical interventions for endometrial cancer **[**3,4,8**]**. A retrospective study by Elit et al. found that patients with uterine cancer that had surgery within 2 weeks of diagnosis and patients with wait times greater than twelve weeks had a significantly decreased survival than patients within the timeframe of two to twelve weeks **[**3**]**. Another study by Strohl et al. demonstrated that surgical wait times greater than six weeks portended worse survival outcomes for patients **[**4**]**. This was further elucidated in a study by Nica et al., that examined survival outcomes based on surgical wait times in patients with specifically high grade non-endometrioid endometrial adenocarcinoma **[**8**]**. They found that patients who had definitive surgical management greater than 45 days after consultation had decreased survival **[**8**]**.

Contrary to this data, a study by Mitric et al. demonstrated no difference in survival outcomes for patients with delayed surgical intervention (< 6 weeks, between 6 – 9 weeks, 9 – 12 weeks and > 12 weeks) **[**9**]**.

When discussing patient outcomes, it is important to examine the systems in place that create access barriers. Two of these systems are payor status and healthcare models, which are often linked. An integrated health system, like that of Kaiser Permanente, offers patients a closed-loop model of healthcare where they receive an array of services such as, clinic visits, hospitalization, surgical interventions, pharmaceutical care, and laboratory draws within one system5. This affords patients convenience and allows for simple communication among providers working within this system. Theoretically this decreases the time spent waiting for a specialist referral as providers are covered under the same payor **[**10**]**. Furthermore, their standard of care designates that 75 percent of patients will see a specialist within two weeks of a referral placed by a primary care provider **[**10**]**. This standard of care is different from a community hospital system with heterogenous payer mix (such as Adventist Health White Memorial) in which patients face a variety of barriers. Although not seen in this study, commonly encountered barriers include requiring authorization of referrals by insurance and finding specialists with available appointments. Since these systems are not cohesive, the responsibility of providing records and critical healthcare information to the specialty provider oftentimes falls on the patient which can further delay treatment. A case series from Wake Forest University examined referral times for patients with gynecologic malignancies within a community hospital setting. This study found the mean interval between first evaluation and treatment was 75.9 days, and the mean interval between first evaluation and referral to gynecologic oncology was 39.3 days **[**11**]**. Shalowitz et al., demonstrate longer than average wait times within the community hospital setting studied, consistent with the findings in our study **[**11**]**.

The findings of this study demonstrate that patients receiving care with a centralized managed care health system are afforded more timely surgical intervention than those receiving treatment in a community hospital system with heterogenous payer mix. This did not translate into adverse recurrence or survival outcomes. Due to small effect size, to detect a difference in overall survival with 80% power in this study, 5593 patients would be required in the community hospital system and 3594 in the centralized managed care models. The mean time interval from first Gynecologic Oncology visit to primary surgery in the community hospital system was 66.71 days and 24.95 days in the centralized health system. This discrepancy in the community healthcare system surpasses the standard quality metric of 6 weeks from diagnosis to primary surgery **[**3**]**.

The outcomes of this research need to be examined within the appropriate context. The study only compared data from one hospital within each healthcare system and is therefore not adequately powered to detect a difference in surgical wait times solely due to the healthcare models. Other limitations of this study include its retrospective nature, limited number of surgeons, and unknown insurance payor migration over the predefined period. However, it is important to note that the care provided to patients in the two centers maintained by the same team, delivering consistent care within each institution. Nevertheless, site-specific considerations need to be acknowledged when comparing the two groups.

Despite these limitations, this study demonstrates that patients with endometrial cancer in a centralized managed care health system experienced a shorter interval from diagnosis of endometrial cancer to surgery compared to patients with the same diagnosis in a community hospital system with heterogenous payer mix. There was no difference in recurrence rate; however, this study was not adequately powered to detect a difference in overall survival. While literature review is mixed, studies suggest that shorter surgical wait times for endometrial cancer patients may result in better patient outcomes **[**9**]**.

The idea of quality metrics in healthcare calls on the importance of delineating a standard of care so that patients can access equal treatment opportunities in a timely manner. Understanding how quality metrics affect patient outcomes, other than survival, is an important question that requires further research. A prospective trial is warranted to investigate whether and how centralization of healthcare leads to a meaningful decrease in the time interval from endometrial cancer diagnosis to surgery. The implications on survival and patient outcomes also needs to be further investigated.

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