Supplement

Propensity Score Methods

We created a smaller sample of propensity-score matched patients. We used 14 patient and disease characteristics to estimate each patient's propensity for having a gynecologic oncologist as a primary oncologist. Propensity scores were estimated using a logit model that included age at diagnosis, race and ethnicity indicators, marital status, median income of residential zip code, percent of population with less than a high school education in the residential zip code, SEER registry source, residential urban status, year of diagnosis, cancer site, stage at diagnosis, Medicare/Medicaid dual eligibility, and Charlson comorbidity index (CCI). We matched patients using nearest-neighbor propensity score matching with replacement and, in a sensitivity analysis, without replacement. See Supplement Tables 1, 2 and 3 for characteristics of propensity score-unmatched and matched cohorts.

Sensitivity Analyses

In a sensitivity analysis, we assigned patients based on the specialty with which they had the majority of their oncology appointments in the last year of life, rather than the specialty of the specific oncologist they encountered most. This change resulted in reassignment of only 2.7% of patients.

In an additional sensitivity analysis, we conducted a multivariable linear regression to estimate the association between the proportion of visits with a gynecologic oncologist in the last 12 months of life and the intense end-of-life composite score. While we didn't restrict our sample to patients who only received care with one type of oncologist, the analysis provides an estimate of the effect of changing from 0% gynecologic oncologist visits to 100%. Our sensitivity analysis found that transitioning from 0% gynecologic oncologist visits to 100% gynecologic oncology visits was associated with a 2.43 percentage point decrease in intense end-of-life composite score ($p=0.015$).

Katherine Hicks-Courant, MD

Supplement

Supplement Table 1. Patient characteristics of total and propensity score matched cohorts

	% of Patients											
	Total Cohort				Propensity score matched with replacement				Propensity score matched without replacement			
Covariate	Total (n=12,189)	Patients of MO (n=7,705)	Patients of GO (n=4,484)	p-value	Total (n=7,252)	Patients of MO (n=2,768)	Patients of GO (n=4,484)	p-value	Total (n=8,968)	Patients of MO (n=4,484)	Patients of GO (n=4,484)	p-value
Age at death, years				<0.001				0.027				0.011
66-70	20.5	20.2	21.0		20.6	20.0	21.0		21.1	21.1	21.0	
71-74	19.0	19.2	18.6		18.5	18.2	18.6		18.4	18.2	18.6	
75-79	21.7	22.4	20.5		21.2	22.3	20.5		20.9	21.3	20.5	
80-84	19.4	20.1	18.2		18.9	20.1	18.2		19.2	20.2	18.2	
≥85	19.5	18.1	21.7		20.9	19.5	21.7		20.4	19.2	21.7	
Race				<0.001				0.14				0.64
White	>80	>80	>80		>80	>80	>80		>80	>80	>80	
Black	8.4	7.0	10.8		10.1	9.0	10.8		10.3	9.8	10.8	
Asian or Pacific Islander	4.1	3.8	4.5		4.7	4.9	4.5		4.5	4.5	4.5	
Other or Unknown	<1	<1	<1		<1	<1	<1		<1	<1	<1	
Hispanic	5.9	6.1	5.6	0.22	5.6	5.7	5.6	0.89	5.7	5.7	5.6	0.82
Married	43.8	45.5	41.0	<0.001	41.9	43.4	41.0	0.58	42.2	43.4	41.0	0.27
Charlson comorbidity index, year prior to death				0.007				0.008				0.087
0	54.3	54.0	54.8		54.8	54.8	54.8		54.5	54.3	54.8	
1	24.5	24.9	24.0		24.1	24.3	24.0		23.9	23.9	24.0	
2	10.0	10.4	9.2		9.7	10.6	9.2		9.8	10.5	9.2	
≥3	8.3	8.2	8.5		8.4	8.1	8.5		8.6	8.6	8.5	
Unknown	2.9	2.6	3.5		3.0	2.2	3.5		3.1	2.7	3.5	
Cause of death				<0.001				<0.001				<0.001
Ovary	55.1	60.8	45.4		48.2	52.8	45.4		47.3	49.3	45.4	
Uterus	31.4	28.5	36.4		34.9	32.5	36.4		36.1	35.9	36.4	
Cervix	6.9	6.2	8.1		8.1	8.0	8.1		8.1	8.1	8.1	
Vulva	3.7	2.1	6.4		5.4	3.7	6.4		4.9	3.4	6.4	
Vagina	1.3	1.0	1.7		1.6	1.4	1.7		1.6	1.5	1.7	
Other	1.7	1.5	2.0		1.9	1.7	2.0		1.9	1.9	2.0	
Stage at diagnosis				<0.001				0.19				0.53
I	11.3	10.0	13.5		13.0	12.2	13.5		13.1	12.6	13.5	
II	6.8	6.3	7.4		7.4	7.2	7.4		7.3	7.2	7.4	
III	36.0	35.6	36.6		36.2	35.6	36.6		36.4	36.3	36.6	
IV	32.3	34.7	28.2		29.1	30.6	28.2		28.9	29.6	28.2	
Unknown	13.7	13.3	14.3		14.3	14.4	14.3		14.3	14.3	14.3	
Urban/rural location				<0.001				0.53				0.37
Big metropolitan	>50	>50	>50		>50	>50	>50		>50	>50	>50	
Metropolitan	30.4	32.0	27.7		27.7	27.8	27.7		27.4	27.1	27.7	

Katherine Hicks-Courant, MD
Supplement

Urban	5.6	6.5	4.0		4.3	4.7	4.0		4.3	4.7	4.0	
Less urban	7.1	6.9	7.5		7.7	8.1	7.5		7.9	8.2	7.5	
Rural	2.0	2.2	2.2		2.1	2.1	2.2		2.3	2.3	2.2	
Unknown	<1	<1	<1		<1	<1	<1		<1	<1	<1	
Medicare/Medicaid dual eligible	16.3	15.5	17.5	0.005	17.5	17.5	17.5	0.97	17.7	18.0	17.5	0.52
Zip code % less than high school education				<0.001				0.35				0.37
<5%	15.7	15.1	16.6		16.1	15.4	16.6		16.0	15.5	16.6	
5%-9.9%	29.8	30.9	28.1		28.5	29.2	28.1		28.5	28.8	28.1	
10%-19.9%	32.7	31.9	34.2		33.8	33.1	34.2		33.8	33.4	34.2	
20%-29.9%	14.2	14.0	14.5		14.7	14.9	14.5		14.8	15.1	14.5	
≥30%	6.0	6.5	5.1		5.4	5.9	5.1		5.5	5.8	5.1	
Unknown	1.6	1.6	1.4		1.5	1.5	1.4		1.4	1.5	1.4	
Zip code median income				0.26				0.34				0.95
<$20,000	<1	<1	<1		<1	<1	<1		<1	<1	<1	
$20,000-$44,999	25.6	24.9	26.8		25.9	24.5	26.8		26.5	26.2	26.8	
$45,000-$139,999	70.7	71.3	69.6		70.5	72.0	69.6		69.9	70.1	69.6	
$140,000-$149,999	0.7	0.7	0.6		0.6	0.5	0.6		0.6	0.6	0.6	
≥$150,000	1.0	1.0	0.9		1.0	1.0	0.9		1.0	1.1	0.9	
Unknown	<2	<2	<2		<2	<2	<2		<2	<2	<2	
Registry, year of death				<0.001				<0.001				<0.001
San Francisco	3.3	3.9	2.3		2.5	2.7	2.3		2.5	2.6	2.3	
Connecticut	6.5	6.0	7.2		7.3	7.4	7.2		7.3	7.4	7.2	
Detroit	5.5	3.7	8.7		7.8	6.3	8.7		7.4	6.2	8.7	
Hawaii	0.8	0.5	1.4		1.3	1.0	1.4		1.1	0.8	1.4	
Iowa	6.5	5.9	7.4		7.2	6.9	7.4		7.7	8.0	7.4	
New Mexico	2.2	1.4	3.5		3.1	2.5	3.5		2.9	2.2	3.5	
Seattle	6.0	6.7	4.9		5.4	6.2	4.9		5.2	5.6	4.9	
Utah	2.3	2.9	1.2		1.3	1.6	1.2		1.3	1.4	1.2	
Atlanta	2.9	2.2	4.2		3.8	3.3	4.2		3.9	3.6	4.2	
San Jose	2.1	2.3	1.7		1.9	2.1	1.7		1.9	2.0	1.7	
Los Angeles	7.1	7.7	6.2		6.7	7.4	6.2		6.9	7.5	6.2	
Rural Georgia	<1	<1	<1		<1	<1	<1		<1	<1	<1	
Greater California	17.3	19.8	12.8		13.4	14.4	12.8		13.2	13.6	12.8	
Kentucky	5.8	4.2	8.7		7.7	6.1	8.7		7.6	6.5	8.7	
Louisiana	5.4	5.2	5.7		5.5	5.1	5.7		5.6	5.5	5.7	
New Jersey	16.9	18.7	13.8		14.8	16.4	13.8		14.9	15.9	13.8	
Greater Georgia	7.9	7.6	8.5		8.5	8.5	8.5		8.8	9.2	8.5	
Unknown	<2	<2	<2		<2	<2	<2		<2	<2	<2	

Katherine Hicks-Courant, MD

Supplement

Supplement Table 2. Differences between patients with a primary gynecologic versus medical oncologist in a propensity-score matched cohort with replacement.

	Unmatched				Propensity-Score Matched with Replacement				
	Mean		% Bias	p-value	Mean		% Bias	p-value	% Reduction in absolute bias
Covariate	Gynecologic Oncologists	Medical Oncologists			Gynecologic Oncologists	Medical Oncologists			
Age at diagnosis, years	75.13	74.33	10.1	<0.001	75.13	75.07	0.7	0.740	92.9
Race									
Black	10.79	7	13.4	<0.001	10.79	9.92	3.1	0.177	77.1
American Indian/Alaska Native	0.36	0.42	-0.9	0.619	0.36	0.47	-1.8	0.410	-90.6
Asian or Pacific Islander	4.55	3.79	3.8	0.041	4.55	5.11	-2.8	0.218	26.6
Other or Unknown	0.07	0.04	1.2	0.502	0.07	0.04	0.0	1.0	100.0
Hispanic	5.6	6.14	-2.3	0.223	5.6	6.16	-2.4	0.262	-3.0
Marital status									
Married	41.04	45.45	-8.9	<0.001	41.04	41.75	-1.4	0.493	83.8
Separated	0.42	0.55	-1.7	0.360	0.42	0.58	-2.2	0.296	-28.6
Divorced	9.52	8.75	2.7	0.150	9.52	9.39	0.5	0.829	82.7
Widowed	35.68	32.62	6.5	0.001	35.68	35.68	0.0	1.0	100.0
Unmarried or domestic partner	0.05	0.01	1.9	0.283	0.05	0.11	-3.9	0.257	-111.6
Unknown	4.06	3.83	1.2	0.527	4.06	3.57	2.5	0.225	-113.1
Zip code median income									
$20,000-$44,999	26.83	25.87	2.2	0.244	26.83	24.69	4.9	0.020	-122.5
$45,000-$139,999	63.43	63.4	0.1	0.978	63.43	64.03	-1.2	0.553	-2,296.7
$140,000-$149,999	0.56	0.48	1.1	0.563	0.56	0.60	-0.6	0.781	42.3
$150,000-$199,999	0.71	0.74	-0.3	0.87	0.71	0.78	-0.8	0.713	-156.0
≥$200,000	0.07	0.08	-0.4	0.83	0.07	0.09	-0.8	0.705	-103.4
Unknown	7.96	9.11	-4.1	0.03	7.96	9.37	-5.0	0.018	-22.2
Zip code % less than high school education									
5%-9.9%	25.49	27.19	-3.9	0.041	25.49	25.29	0.5	0.827	88.2
10%-19.9%	32.32	30.36	4.2	0.024	32.32	31.47	1.8	0.389	56.7
20%-29.9%	14.5	13.84	1.9	0.312	14.5	14.05	1.3	0.546	32.5

Katherine Hicks-Courant, MD
Supplement

≥30%	5.87	7.19	-5.4	0.005	5.87	6.33	-1.9	0.34	64.6
Unknown	7.76	8.98	-4.4	0.02	7.76	9.17	-5.1	0.017	-15.1
Registry, year of diagnosis									
Connecticut	6.67	5.71	4	0.033	6.67	7.45	-3.2	0.149	18.5
Detroit	8.34	3.43	21	<0.001	8.34	7.40	4.0	0.100	80.9
Hawaii	1.27	0.44	9	<0.001	1.27	1.92	-7.0	0.014	22.1
Iowa	7.09	5.59	6.1	0.001	7.09	7.38	-1.2	0.596	80.6
New Mexico	3.19	1.27	13	<0.001	3.19	3.28	-0.6	0.811	95.3
Seattle	4.44	6.14	-7.6	<0.001	4.44	4.51	-0.3	0.878	96.1
Utah	1.18	2.69	-10.9	<0.001	1.18	1.09	0.6	0.690	94.1
Atlanta	3.84	2.08	10.4	<0.001	3.84	4.08	-1.5	0.551	86.1
San Jose	1.74	2.17	-3.1	0.105	1.74	1.76	-0.2	0.936	94.8
Los Angeles	5.89	7.24	-5.5	0.004	5.89	6.11	-0.9	0.657	83.5
Rural Georgia	0.27	0.2	1.5	0.409	0.27	0.60	-7.0	0.016	-358.6
Greater California	11.49	18.05	-18.6	<0.001	11.49	9.92	4.4	0.017	76.2
Kentucky	8.1	3.88	17.8	<0.001	8.1	7.58	2.2	0.366	87.8
Louisiana	5.26	4.91	1.6	0.385	5.26	4.17	5.0	0.015	-205.9
New Jersey	12.94	17.05	-11.6	<0.001	12.94	12.69	0.7	0.728	94.0
Greater Georgia	8.01	6.92	4.1	0.026	8.01	8.36	-1.4	0.538	67.2
Unknown	8.21	8.67	-1.7	0.377	8.21	9.59	-5.0	0.021	-198.8
Urban/rural location									
Metropolitan	25.27	29.67	-9.9	<0.001	25.27	24.26	2.3	0.271	77.2
Urban	4.04	5.94	-8.8	<0.001	4.04	4.44	-1.8	0.345	79.0
Less urban	7.16	6.74	1.7	0.374	7.16	7.76	-2.4	0.278	-42.4
Rural	2.16	1.87	2.1	0.26	2.16	2.1	0.5	0.826	77.3
Unknown	6.42	7.27	-3.3	0.077	6.42	7.78	-5.4	0.012	-61.0
Year of diagnosis									
2001	1.76	2.25	-3.5	0.07	1.76	1.87	-0.8	0.693	76.9
2002	1.99	3.09	-7	<0.001	1.99	2.39	-2.6	0.194	63.6
2003	2.72	4.21	-8.1	<0.001	2.72	2.88	-0.9	0.654	89.5

Katherine Hicks-Courant, MD
Supplement

2004	4.17	5.22	-5	0.009	4.17	4.26	-0.4	0.834	91.5
2005	7.09	8.88	-6.6	0.001	7.09	6.51	2.1	0.276	67.5
2006	9.63	10.64	-3.3	0.077	9.63	8.88	2.5	0.215	24.8
2007	8.92	9.63	-2.4	0.195	8.92	9.41	-1.7	0.421	30.8
2008	10.42	9.44	3.3	0.079	10.42	11.06	-2.2	0.323	34.0
2009	10.30	9.62	2.3	0.221	10.30	9.41	3.0	0.157	-30.0
2010	9.43	8.74	2.4	0.193	9.43	10.06	-2.2	0.319	10.7
2011	8.79	8.16	2.2	0.231	8.79	9.14	-1.3	0.554	42.7
2012	7.61	6.96	2.5	0.182	7.61	7.54	0.3	0.905	89.7
2013	7.78	5.96	7.2	<0.001	7.78	7.18	2.4	0.279	67.0
2014	5.6	4.01	7.4	<0.001	5.6	5.53	0.3	0.890	95.8
2015	2.63	1.40	8.8	<0.001	2.63	2.74	-0.8	0.744	90.9
Cancer type									
Ovary	35.91	27.98	17.1	<0.001	35.91	34.37	3.3	0.127	80.6
Uterus, corpus	2.28	1.71	4	0.029	2.28	2.48	-1.4	0.533	64.3
Uterus, NOS	42.42	57.51	-30.5	<0.001	42.42	42.98	-1.1	0.594	96.3
Vulva	1.65	1.22	3.6	0.049	1.65	1.56	0.8	0.737	79.3
Vagina	6.85	2.18	22.6	<0.001	6.85	6.67	0.9	0.736	96.2
Other	3.23	3.19	0.7	0.696	3.23	3.86	-3.0	0.173	-311.1
Medicare/Medicaid dual eligible	15.79	13.2	7.4	<0.001	15.79	16.01	-0.6	0.773	91.4
Stage at diagnosis									
II	7.45	6.35	4.3	0.019	7.45	6.80	2.6	0.234	41.3
III	36.55	35.63	1.9	0.304	36.55	34.95	3.3	0.113	-73.4
IV	28.17	34.73	-14.2	<0.001	28.17	28.99	-1.8	0.387	87.4
Unknown	14.32	13.34	2.8	0.131	14.32	15.05	-2.1	0.325	24.6
Charlson comorbidity index, year prior to diagnosis									
1	19.34	19.43	-0.2	0.9	19.34	18.56	2.0	0.346	-734.6
2	6.02	5.59	1.8	0.328	6.02	5.53	2.1	0.319	-14.7
≥3	4.15	3.31	4.4	0.017	4.15	3.70	2.4	0.277	46.8
Unknown	14.07	15.06	-2.8	0.139	14.07	15.08	-2.8	0.178	-2.1

Katherine Hicks-Courant, MD

Supplement

Supplement Table 3. Differences between patients with a primary gynecologic versus medical oncologist in a propensity-score matched cohort without replacement.

	Unmatched				Propensity-Score Matched with Replacement				
	Mean		% Bias	p-value	Mean		% Bias	p-value	% Reduction in absolute bias
Covariate	Gynecologic Oncologists	Medical Oncologists			Gynecologic Oncologists	Medical Oncologists			
Age at diagnosis, years	75.13	74.33	10.1	<0.001	75.13	74.54	7.3	0.001	26.9
Race									
Black	10.79	7	13.4	<0.001	10.79	9.84	3.4	0.135	74.8
American Indian/Alaska Native	0.36	0.42	-0.9	0.619	0.36	0.40	-0.7	0.731	23.7
Asian or Pacific Islander	4.55	3.79	3.8	0.041	4.55	4.55	0.0	1.0	100.0
Other or Unknown	0.07	0.04	1.2	0.502	0.07	0.05	1.0	0.655	20.3
Hispanic	5.6	6.14	-2.3	0.223	5.6	5.71	-0.5	0.819	79.4
Marital status									
Married	41.04	45.45	-8.9	<0.001	41.04	43.35	-4.7	0.026	47.5
Separated	0.42	0.55	-1.7	0.360	0.42	0.56	-1.9	0.365	-10.2
Divorced	9.52	8.75	2.7	0.150	9.52	9.17	1.2	0.562	54.0
Widowed	35.68	32.62	6.5	0.001	35.68	33.65	4.3	0.043	33.8
Unmarried or domestic partner	0.05	0.01	1.9	0.283	0.05	0.02	1.3	0.564	29.5
Unknown	4.06	3.83	1.2	0.527	4.06	3.77	1.5	0.479	-25.9
Zip code median income									
$20,000-$44,999	26.83	25.87	2.2	0.244	26.83	25.94	2.0	0.338	7.3
$45,000-$139,999	63.43	63.4	0.1	0.978	63.43	62.09	2.8	0.190	-5,226.0
$140,000-$149,999	0.56	0.48	1.1	0.563	0.56	0.60	-0.6	0.781	42.3
$150,000-$199,999	0.71	0.74	-0.3	0.87	0.71	0.85	-1.6	0.472	-412.1
≥$200,000	0.07	0.08	-0.4	0.83	0.07	0.09	-0.8	0.705	-103.4
Unknown	7.96	9.11	-4.1	0.03	7.96	10.08	-7.6	<0.001	-84.3
Zip code % less than high school education									
5%-9.9%	25.49	27.19	-3.9	0.041	25.49	25.27	0.5	0.808	86.9
10%-19.9%	32.32	30.36	4.2	0.024	32.32	30.87	3.1	0.140	26.0
20%-29.9%	14.5	13.84	1.9	0.312	14.5	14.52	-0.1	0.976	96.6

Katherine Hicks-Courant, MD
Supplement

≥30%	5.87	7.19	-5.4	0.005	5.87	6.11	-1.0	0.624	81.5
Unknown	7.76	8.98	-4.4	0.02	7.76	9.95	-7.9	<0.001	-79.1
Registry, year of diagnosis									
Connecticut	6.67	5.71	4.0	0.033	6.67	6.94	-1.1	0.615	72.1
Detroit	8.34	3.43	21.0	<0.001	8.34	5.84	10.7	<0.001	49.2
Hawaii	1.27	0.44	9.0	<0.001	1.27	0.76	5.6	0.015	38.2
Iowa	7.09	5.59	6.1	0.001	7.09	7.69	-2.5	0.276	59.8
New Mexico	3.19	1.27	13.0	<0.001	3.19	2.12	7.3	0.002	44.2
Seattle	4.44	6.14	-7.6	<0.001	4.44	4.93	-2.2	0.272	71.2
Utah	1.18	2.69	-10.9	<0.001	1.18	1.23	-0.3	0.846	97.0
Atlanta	3.84	2.08	10.4	<0.001	3.84	3.52	1.8	0.432	82.3
San Jose	1.74	2.17	-3.1	0.105	1.74	1.87	-1.0	0.634	68.7
Los Angeles	5.89	7.24	-5.5	0.004	5.89	7.07	-4.8	0.023	12.7
Rural Georgia	0.27	0.2	1.5	0.409	0.27	0.34	-1.4	0.563	8.3
Greater California	11.49	18.05	-18.6	<0.001	11.49	11.42	0.2	0.921	99.0
Kentucky	8.1	3.88	17.8	<0.001	8.1	6.2	8.0	<0.001	55.0
Louisiana	5.26	4.91	1.6	0.385	5.26	5.31	-0.2	0.925	87.5
New Jersey	12.94	17.05	-11.6	<0.001	12.94	13.89	-2.7	0.183	76.7
Greater Georgia	8.01	6.92	4.1	0.026	8.01	8.41	-1.5	0.489	63.1
Unknown	8.21	8.67	-1.7	0.377	8.21	10.33	-7.6	0.001	-357.9
Urban/rural location									
Metropolitan	25.27	29.67	-9.9	<0.001	25.27	23.86	3.2	0.122	68.1
Urban	4.04	5.94	-8.8	<0.001	4.04	4.08	-0.2	0.915	97.7
Less urban	7.16	6.74	1.7	0.374	7.16	7.94	-3.1	0.162	-84.6
Rural	2.16	1.87	2.1	0.26	2.16	2.25	-0.6	0.774	69.7
Unknown	6.42	7.27	-3.3	0.077	6.42	8.43	-7.9	<0.001	-137.5
Year of diagnosis									
2001	1.76	2.25	-3.5	0.07	1.76	1.87	-0.8	0.693	76.9
2002	1.99	3.09	-7	<0.001	1.99	2.19	-1.3	0.506	81.8
2003	2.72	4.21	-8.1	<0.001	2.72	3.03	-1.7	0.377	79.0

Katherine Hicks-Courant, MD
Supplement

2004	4.17	5.22	-5	0.009	4.17	4.28	-0.5	0.793	89.3
2005	7.09	8.88	-6.6	0.001	7.09	7.49	-1.5	0.465	77.5
2006	9.63	10.64	-3.3	0.077	9.63	9.72	-0.3	0.886	91.2
2007	8.92	9.63	-2.4	0.195	8.92	9.28	-1.2	0.557	49.7
2008	10.42	9.44	3.3	0.079	10.42	10.35	0.2	0.917	93.2
2009	10.30	9.62	2.3	0.221	10.30	10.33	-0.1	0.972	96.7
2010	9.43	8.74	2.4	0.193	9.43	9.66	-0.8	0.719	68.1
2011	8.79	8.16	2.2	0.231	8.79	8.88	-0.3	0.882	85.7
2012	7.61	6.96	2.5	0.182	7.61	7.61	0.0	1.0	100.0
2013	7.78	5.96	7.2	<0.001	7.78	6.82	3.8	0.081	47.5
2014	5.6	4.01	7.4	<0.001	5.6	5.24	1.7	0.456	77.5
2015	2.63	1.40	8.8	<0.001	2.63	2.12	3.7	0.111	58.3
Cancer type									
Ovary	35.91	27.98	17.1	<0.001	35.91	35.88	0.0	0.982	99.7
Uterus, corpus	2.28	1.71	4	0.029	2.28	2.23	0.3	0.887	92.1
Uterus, NOS	42.42	57.51	-30.5	<0.001	42.42	45.07	-5.4	0.011	82.4
Vulva	1.65	1.22	3.6	0.049	1.65	1.67	-0.2	0.934	94.8
Vagina	6.85	2.18	22.6	<0.001	6.85	3.61	15.7	<0.001	30.7
Other	3.23	3.19	0.7	0.696	3.23	3.55	-1.3	0.562	-71.3
Medicare/Medicaid dual eligible	15.79	13.2	7.4	<0.001	15.79	16.68	-2.5	0.252	65.6
Stage at diagnosis									
II	7.45	6.35	4.3	0.019	7.45	7.18	1.1	0.627	75.7
III	36.55	35.63	1.9	0.304	36.55	36.29	0.6	0.792	71.1
IV	28.17	34.73	-14.2	<0.001	28.17	29.59	-3.1	0.136	78.3
Unknown	14.32	13.34	2.8	0.131	14.32	14.3	0.1	0.976	97.7
Charlson comorbidity index, year prior to diagnosis									
1	19.34	19.43	-0.2	0.9	19.34	19.25	0.2	0.915	4.6
2	6.02	5.59	1.8	0.328	6.02	5.75	1.1	0.590	37.4
≥3	4.15	3.31	4.4	0.017	4.15	3.86	1.5	0.484	65.4
Unknown	14.07	15.06	-2.8	0.139	14.07	16.06	-5.6	0.009	-101.9

Katherine Hicks-Courant, MD

Supplement

Supplement Table 4. Outpatient Healthcare Common Procedure Coding System (HCPCS) codes.

HCPCS Code	Definition
99201-99205	Office or other outpatient services
99211-99215	Office or other outpatient services
99241-99245	Consultations
99271-99275	Confirmatory consultation codes
99261-99263	Follow-up consultation codes
99354-99355	Prolonged physician service
99381-99429	Preventive medicine
G0408	follow-up consultation, telehealth
G0438- G0439	Annual wellness visit
G0463	Outpatient clinic visit
G0466- G0467	FQHC visit
M0064	Brief office visit for changing prescriptions (psych)
S0260	H&P for surgery
T1015	Clinic visit
99999	Pre-operative H&P
G0344	Initial preventive physical
99261	follow-up consultation
99262	follow-up consultation
99263	follow-up consultation
99271	confirmatory consultation
99272	confirmatory consultation
99383	Initial comprehensive preventive medicine evaluation
99386	Initial comprehensive preventive medicine evaluation
99393	Periodic comprehensive preventive medicine
99396	Periodic comprehensive preventive medicine
99402	Preventive medicine counseling
99403	Preventive medicine counseling
G0402	Initial preventive physical exam
G9050	Oncology, primary focus of visit
G9051	Oncology, primary focus of visit
G9052	Oncology, primary focus of visit
G9053	Oncology, primary focus of visit
G9054	Oncology, primary focus of visit
G9055	Oncology, primary focus of visit
G9056	Oncology, primary focus of visit
S0613	Annual gyn exam
S9088	Urgent care services
99024	Postop f/u visit
98969	online digital evaluation and management
99056	Service(s) typically provided in the office, provided out of the office at request of patient, in addition to basic service
99053	Service(s) provided between 10:00 PM and 8:00 AM at 24-hour facility, in addition to basic service
99051	Service(s) provided in the office during regularly scheduled evening, weekend, or holiday office hours, in addition to basic service
99058	Service(s) provided on an emergency basis in the office, which disrupts other scheduled office services, in addition to basic service
99050	Services provided in the office at times other than regularly scheduled office hours, or days when the office is normally closed (e.g., holidays, Saturday or Sunday), in addition to basic service

Katherine Hicks-Courant, MD

Supplement

Supplement Table 5. Difference in end-of-life care outcomes by primary oncologist specialty.

	Model 1: Simple				Model 2: Multivariable[a]		
	n	**% of Patients**	**95% CI**	**p-value**	**% of Patients**	**95% CI**	**p-value**
Chemotherapy in last 14 days							
Medical oncologist	7,705	7.99	7.39, 8.60	<0.001	7.83	7.23, 8.43	<0.001
Gynecologic oncologist	4,484	5.33	4.63, 6.03		5.61	4.9, 6.32	
Death in the hospital							
Medical oncologist	7,705	15.87	15.03, 16.72	0.113	15.69	14.85, 16.52	0.315
Gynecologic oncologist	4,484	14.63	13.35, 15.91		14.94	13.78, 16.10	
Enrollment in hospice < 3 days							
Medical oncologist	7,705	10.68	9.98, 11.38	0.702	10.77	10.07, 11.47	0.995
Gynecologic oncologist	4,484	10.93	9.88, 11.98		10.77	9.72, 11.82	
>1 Emergency department visit in the last 30 days of life							
Medical oncologist	7,705	14.71	13.88, 15.55	0.159	15.02	14.18, 15.86	0.009
Gynecologic oncologist	4,484	13.69	12.54, 14.85		13.17	12.11, 14.23	
>1 Hospital admission in the last 30 days of life							
Medical oncologist	7,705	12.54	11.79, 13.29	0.585	12.56	11.81, 13.30	0.645
Gynecologic oncologist	4,484	12.91	11.79, 14.03		12.88	11.81, 13.94	
> 14 Days in the hospital in the last 30 days of life							
Medical oncologist	7,705	24.06	23.05, 25.07	0.149	23.76	22.76, 24.76	0.631
Gynecologic oncologist	4,484	22.81	21.45, 24.17		23.33	21.94, 14.72	
Any intensive care unit admission in the last 30 days of life							
Medical oncologist	7,705	11.07	10.35, 11.79	0.352	11.18	10.47, 11.9	0.597
Gynecologic oncologist	4,484	11.73	10.54, 12.92		11.54	10.48, 12.59	
Invasive procedures in the last 30 days of life							
Medical oncologist	7,705	40.95	39.81, 42.08	0.068	40.71	39.61, 41.81	0.014
Gynecologic oncologist	4,484	42.86	41.14, 44.58		43.27	41.62, 44.93	

a: Covariates included in the multivariable regression models: age at death, race, ethnicity, marital status, median income of residential zip code at death, percent of people with less than a high school education in the residential zip code at death, SEER registry at death, residential urban status at death, year of diagnosis, year of death, cancer site, cause of death, stage at diagnosis, Medicare/Medicaid dual eligibility at death, and Charlson comorbidity index at death

Katherine Hicks-Courant, MD

Supplement

Supplement Table 6. Difference in composite rate of high-intensity end-of-life care by primary outpatient oncologist type and cancer site.

	Model 1: Simple				Model 2: Multivariable linear			Model 3: Multivariable logistic		
	n	**% of intense EOL care**	**95% CI**	**p-value**	**% of intense EOL care**	**95% CI**	**p-value**	**Odds ratio**	**95% CI**	**p-value**
Entire cohort[a]										
Medical oncologist	7,705	56.51	55.35, 57.66	0.028	56.56	55.4, 57.73	0.018	1	REF	0.018
Gynecologic oncologist	4,484	54.06	52.2, 55.92		53.97	52.21, 55.72		0.90	0.82, 0.98	
Ovary[a]										
Medical oncologist	4,682	56.22	54.78, 57.65	0.038	56.14	54.69, 57.58	0.046	1	REF	0.044
Gynecologic oncologist	2,035	53.02	50.38, 55.67		53.21	50.76, 55.66		0.89	0.79, 1	
Uterus[a]										
Medical oncologist	2,194	57.70	55.57, 59.83	0.28	57.41	55.22, 59.59	0.508	1	REF	0.502
Gynecologic oncologist	1,630	55.83	53.18, 58.48		56.22	53.61, 58.84		0.95	0.82, 1.10	
Cervix[a]										
Medical oncologist	475	56.63	52.22, 61.04	0.991	57.48	52.96, 62	0.587	1	REF	0.537
Gynecologic oncologist	364	56.59	51.6, 61.59		55.49	50.34, 60.63		0.90	0.66, 1.24	
Vulva[a]										
Medical oncologist	158	55.06	47.23, 62.89	0.300	56.31	47.08, 65.54	0.238	1	REF	0.184
Gynecologic oncologist	289	49.83	43.73, 55.92		49.15	42.87, 55.43		0.71	0.43, 1.18	
Vagina[a]										
Medical oncologist	78	44.87	33.88, 55.86	0.679	40.08	27.35, 52.81	0.581	1	REF	0.124
Gynecologic oncologist	77	41.56	30.2, 52.92		46.12	31.77 61.06		4.39	0.67, 28.89	
Other[a]										
Medical oncologist	118	55.08	45.94, 64.23	0.545	53.98	43.68, 64.29	0.450	1	REF	0.269
Gynecologic oncologist	89	59.55	48.26, 70.84		61.01	48.09, 73.93		1.65	0.68, 3.99	

a: Covariates included in the multivariable regression models: age at death, race, ethnicity, marital status, median income of residential zip code at death, percent of people with less than a high school education in the residential zip code at death, SEER registry at death, residential urban status at death, year of diagnosis, year of death, cause of death, stage at diagnosis, Medicare/Medicaid dual eligibility at death, and Charlson comorbidity index at death

Katherine Hicks-Courant, MD

Supplement

Supplement Table 7. Most common procedures in the last 30 days of life among patients with gynecologic cancer.

Code Type	Code	Definition
CPT	49083	Abdominal paracentesis with imaging guidance
CPT	49080	Abdominal paracentesis
ICD	5491	Percutaneous abdominal drainage
ICD	9915	Parenteral infusion of concentrated nutritional substances
ICD	3491	Thoracentesis
CPT	36556	Insertion of non-tunneled central venous catheter
CPT	31500	Emergency endotracheal intubation
ICD	9604	Insertion of endotracheal tube
CPT	32555	Thoracentesis
CPT	36569	Peripherally inserted central catheter
CPT	36561	Insertion tunneled central line with port
ICD	9671	Continuous invasive mechanical ventilation for less than 96 consecutive hours
CPT	11721	Debridement of nail(s) by any method(s)
CPT	92950	Cardiopulmonary resuscitation
CPT	52332	Cystourethroscopy, with insertion of indwelling ureteral stent
CPT	32422	Thoracentesis with insertion of tube, includes water seal
CPT	32421	Thora puncture of pleural cavity
CPT	43239	Esophagogastroduodenoscopy, flexible, transoral; with biopsy, single or multiple
ICD	4311	Percutaneous [endoscopic] gastrostomy
ICD	3404	Insertion of intercostal catheter for drainage
CPT	50392	Nephrostomy tube placement
ICD	387	Interruption of the vena cava
ICD	4516	Esophagogastroduodenoscopy [EGD] with closed biopsy
ICD	9607	Insertion of other (naso-)gastric tube
CPT	43246	Gastric tube