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An increase in multi-site practices: The shifting paradigm for gynecologic cancer care delivery

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HIGHLIGHTS

- There was no significant change in the number of GOs from 2015 to 2019.
- The number of practice sites per gynecologic oncologist increased from 2015 to 2019.
- Gynecologic oncologists' practice site dispersion increased from 2015 to 2019.
- Geographic regions containing gynecologic oncologists increased from 2015 to 2019.

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ABSTRACT

Objective. To assess whether the number of practice sites per gynecologic oncologist (GO) and geographic access to GOs has changed over time.

Methods. This is a retrospective repeated cross-sectional study using the 2015–2019 Physician Compare National File. All GOs in the 50 United States and Washington, DC, who had completed at least one year of practice were included in the study. All practice sites with complete addresses were included. Linear regression analyses estimated trends in GOs' number of practice sites and geographic dispersion of practice sites. Secondary analyses assessed temporal trends in the number of geographic areas served by at least one GO.

Results. Although there was no significant change in the number of GOs from 2015 to 2019 ($n = 1328$), there was a significant increase in the number of practice sites (881 to 1416, $p = 0.03$), zip codes (642 to 984, $p = 0.03$), HSAs (404 to 536, $p = 0.04$), and HRRs (218 to 230, $p = 0.03$) containing a GO practice. The mean number of practice sites (1.64 versus 2.13, $p < 0.001$) and dispersion of practice sites (0.03 versus 0.43 miles, $p = 0.049$) per GO increased significantly.

Conclusions. Between 2015 and 2019, an increasing number of GOs have multi-site practices, and more geographic regions contain a GO practice. Improvements in geographic access to GOs may represent improved access to care for many women in the US, but its effect on patients, physicians, and geographic disparities is unknown.

1. Introduction

In 2019, there were estimated to be 109,000 new gynecologic cancer cases in the United States (US) [1], compared to 98,280 in 2015 [2]. With the number of women with gynecologic cancers on the rise, widespread access to high-quality gynecologic cancer care [3–7] is increasingly important. One significant barrier to accessing gynecologic oncology specialist care is geographic access [8]. With only 7% of oncologists practicing in rural areas [9], almost 10% of women in the US live in counties greater than 50 miles from the closest gynecologic oncologist [10]. Many patients may travel far distances to access high-quality cancer care [11], but there is evidence that a larger distance traveled by patients is associated with a lower likelihood of completing cancer treatment [12,13]. This disparity may reflect inherent differences between patients who live far from versus close to a hospital, or that patient travel imposes significant burdens on cancer patients and their families.

One approach to providing high-quality cancer care to a growing patient population is to change where and how high-quality cancer care is being delivered. The last ten years have seen an increase in the amount of consolidation of physician practices by hospitals and incorporation of

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smaller medical practices into larger medical centers [9,14]. From 2016 to 2017, there was a 2.6% decrease in the number of oncology practices, but a quarter of oncology practices increased in size [9]. Furthermore, in 2017, over a quarter of oncology practices reported a merger or opening of a new practice [9]. In addition, it is unclear whether having multiple practice sites impacts the quality or type of care that a physician provides or how a patient may experience cancer care.

The primary objective this study is to assess whether the number of practice sites and dispersion of practice sites per gynecologic oncologist have changed over time. The secondary objective is to determine whether geographic access to gynecologic oncologists has changed over time. We hypothesize that there is an increasing trend in the number of practice sites per gynecologic oncologist and the geographic area containing a gynecologic oncologist practice over time.

2. Methods

2.1. Data source

The primary data source for this retrospective repeated cross-sectional study was the 2015–2019 Physician Compare National Downloadable File [15]. This data set is publicly available and contains specialty and practice site information for all physicians who have registered with the Centers for Medicare & Medicaid Services (CMS) and have submitted a Medicare Fee-for-Services claim or be newly enrolled with CMS within the last six months [16]. In this dataset, physicians are identifiable by name and National Provider Identifier (NPI). The data also include graduation year, primary specialty and up to four secondary specialties for each physician. Practice sites are included if the CMS practice locations match the zip code included on Medicare claims submitted in the previous six months [16]. Physicians with multiple practice locations have an entry for each practice location, regardless of whether the practice sites belong to the same hospital system.

2.2. Study population

All gynecologic oncologists in the 50 United States and Washington, DC, who had completed at least one year of practice were included in the study. Gynecologic oncologists were identified by listing all physicians in Physician Compare who reported gynecologic oncology as a primary specialty or a verified secondary specialty. Secondary specialty was verified by reviewing all NPIs with gynecologic oncology listed as a secondary specialty. First, the NPI and specialty were confirmed using the NPI database [17]. If the listed specialty in the NPI database was gynecologic oncology, the physician was included in the study. If the listed specialty was "obstetrics & gynecology, "specialty," "hospitalist" or "student," the specialty was verified through the physician's professional website, Doximity [18], LinkedIn [19] or SGO directory [20]. Physicians with all other listed specialties were excluded from the study. In the final study sample, 92.47% of physicians had gynecologic oncology listed as a primary specialty.

We included physicians who had finished at least one year of practice to minimize any bias from inclusion of practice sites during fellowship training. For each year of data, we identified physicians whose graduation year was not consistent with at least one year of practice, assuming a 3-year gynecologic oncology fellowship without a gap between fellowship and residency. Graduation year was then confirmed on the physician's professional website, Doximity, or LinkedIn. If the physician was confirmed to not be a gynecologic oncologist, then s/he was excluded from the study.

After limiting the study population to physicians with gynecologic oncology as a primary specialty or verified secondary specialty and who completed at least one year of practice, we checked the accuracy of our gynecologic oncology specialty definition by performing an additional specialty verification of a random 5% sample of the physicians in the entire study sample. The specialty of each NPI in the sample was confirmed by the physician's professional website, Doximity, LinkedIn, or the SGO directory. A total of 67 physicians were reviewed. Two physicians' specialties were unable to be verified, and five physicians were verified to not be gynecologic oncologists.

2.3. Primary outcome

All practice sites in the 50 states and Washington, DC, with complete addresses were included. The data do not identify a primary practice site or contain data about a physician's distribution of time at multiple practice sites. The distance between each of a physician's practice sites was calculated each year using Stata's georoute package [21]. This software calculates the estimated travel distance by car. The software is unable to calculate travel distance that cannot be completed by car (e.g. between islands of Hawaii). Site dispersion was calculated as the median practice site distance for each physician per year. Site dispersion was defined as the geographic spread of a physician's practice.

If a physician moved to a new practice region over the course of the year, the site dispersion may be falsely high. In order to minimize bias from physicians changing regions of practice, all the practice site addresses of all site distances over 400 miles were individually reviewed. Practice site distances between 400 and 600 miles included physicians who practice across state lines. All practice site distances over 600 miles were consistent with the physician moving across regions. Forty-two physicians had practice site distances over 600 miles, and all physician-years with practice site distances over 600 miles were therefore excluded.

2.4. Secondary outcome

Geographic access to gynecologic oncologists was defined as the number of gynecologic oncologists per zip code, hospital service area (HSA), hospital referral region (HRR), and state. HSAs and HRRs were identified based on zip code. Each HSA represents a local health care market. Each zip code is assigned to an HSA based on where the greatest proportion of Medicare residents are hospitalized. In 2015, there were 3436 HSAs in the US [22]. Each HRR is an aggregation of HSAs and represents a regional health care market. In 2015, there were 306 HRRs in the US [22].

2.5. Analytic approach & descriptive analyses

We calculated the number of unique practice sites for each physician per year. In order to minimize bias from potential outliers, we removed the physician-year observations in the top 1% of practice sites (10 or more sites). Descriptive analyses included the calculation of the number of gynecologic oncologists and unique practice sites in the US per year, as well as the number of zip codes, HSAs, HRRs, and states in the US that contained a gynecologic oncology practice for each year.

Table 1
Trends in the number of gynecologic oncologists, practice sites, and geographic regions containing a gynecologic oncologist's practice, 2015–2019.

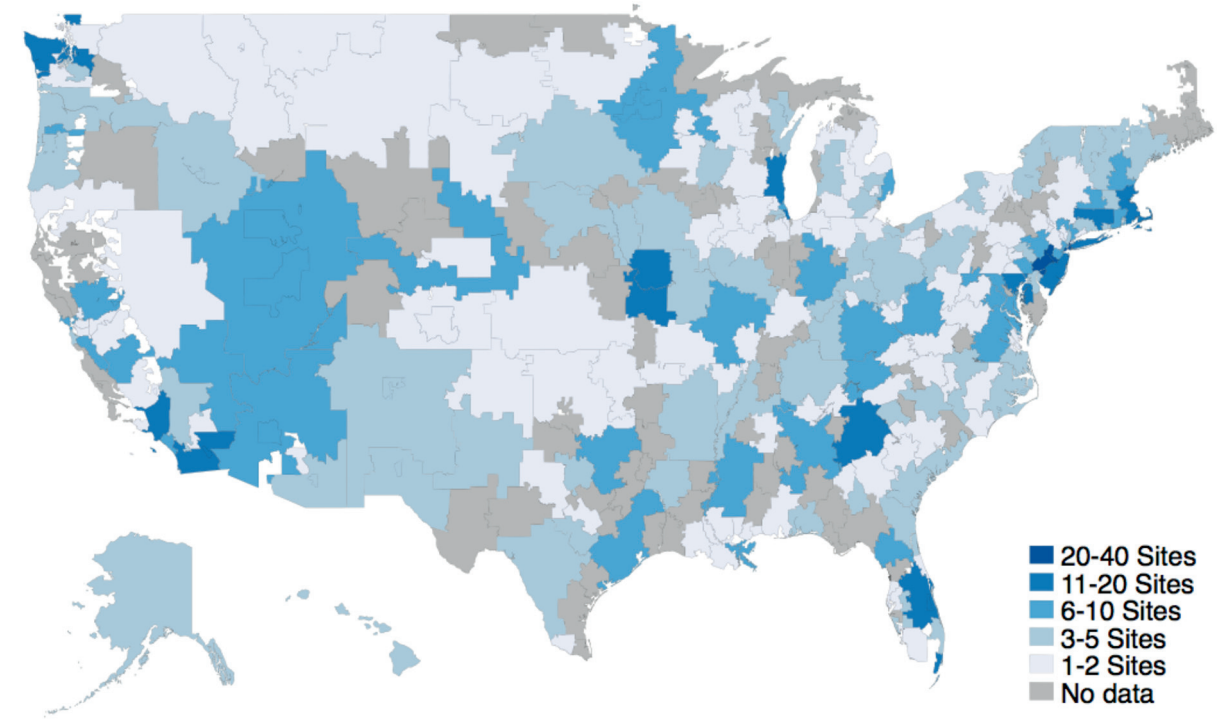
	2015	2016	2017	2018	2019	*p*-value*
Gynecologic oncologists	1088	1135	1145	1145	1157	0.06
Practice sites	881	939	964	1410	1416	0.03
Zip codes	642	709	718	989	984	0.03
Health service areas	404	443	439	554	536	0.04
Hospital referral regions	218	220	224	233	230	0.03
States	50	51	51	51	51	0.18

* *p*-value of linear trend in regression model.

2.6. Primary outcome analyses

In addition to identifying the number of practice sites per physician, we calculated the number of zip codes, HSAs, HRRs, and states for each physician per year. The mean number of practice sites per gynecologic oncologist and the mean site dispersion were also calculated by geographic region for each year, allowing for overlap for gynecologic oncologists who practice in multiple zip codes.

Trends in the number of gynecologic oncologists and unique practice sites in the US over the study period were estimated using linear regression models. Temporal trends in the number of practice sites, zip codes, HSAs, HRRs, states and site dispersion per gynecologic oncologist were



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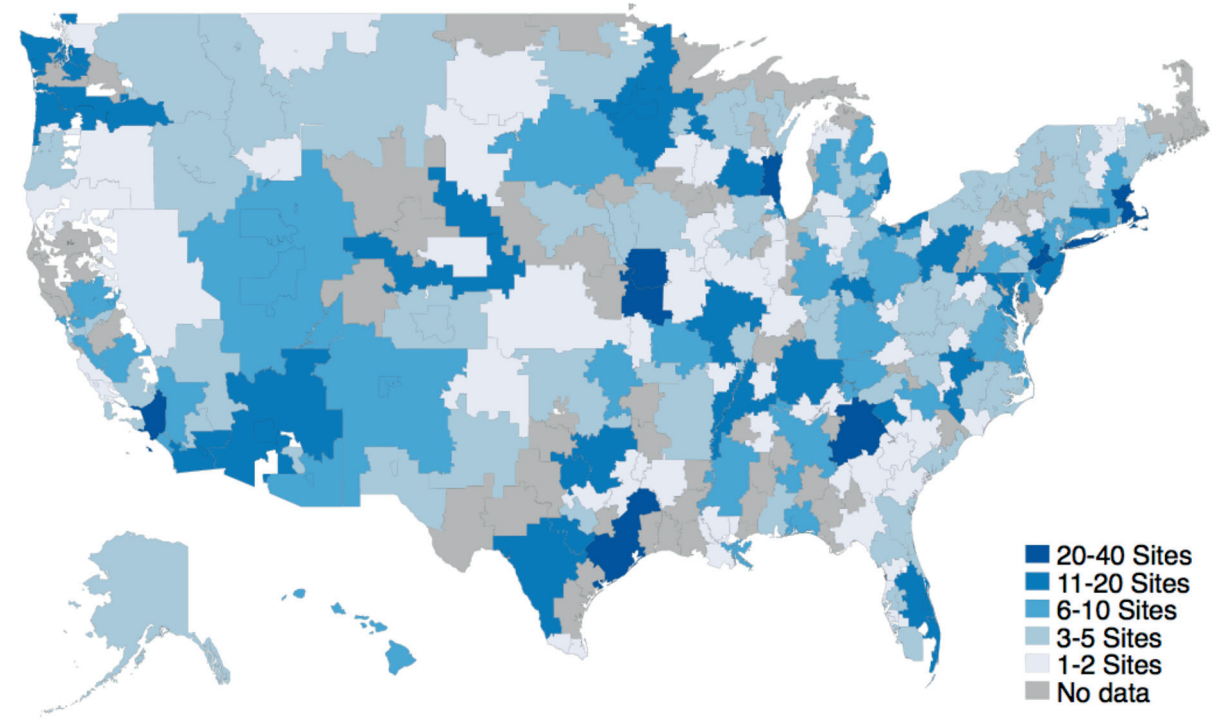

B

Fig. 1. Distribution of unique gynecologic oncology practice sites per hospital referral region in 2015 (A) and 2019 (B).

Table 2
Trends in the number of practice sites, site dispersion, and geographic regions per gynecologic oncologist (GO), 2015–2019.

Year	Practice sites per GO				Site dispersion per GO (miles)				Zip codes per GO				HSA per GO				HRR per GO				States per GO			
	Mean	SE	95% CI	p-value	Mean	SE	95% CI	p-value	Mean	SE	95% CI	p-value	Mean	SE	95% CI	p-value	Mean	SE	95% CI	p-value	Mean	SE	95% CI	p-value
2015	1.64	0.03	1.58–1.71	REF	0.03	0.02	−0.00 −0.06	REF	1.28	0.02	1.25–1.32	REF	1.19	0.01	1.16–1.22	REF	1.11	0.01	1.09–1.13	REF	1.04	0.01	1.03–1.0	REF
2016	1.54	0.03	1.48–1.59	0.001	0.00	0.00	0.00–0.01	0.13	1.32	0.02	1.28–1.35	0.04	1.21	0.01	1.18–1.24	0.09	1.12	0.01	1.10–1.14	0.26	1.04	0.01	1.03–1.06	0.74
2017	1.55	0.03	1.49–1.61	0.008	0.01	0.01	0.00–0.03	0.37	1.34	0.02	1.30–1.38	0.002	1.24	0.02	1.21–1.27	0.002	1.14	0.01	1.12–1.17	0.01	1.07	0.01	1.05–1.08	<0.001
2018	2.19	0.05	2.10–2.28	<0.001	0.31	0.08	0.15–0.46	0.001	1.77	0.03	1.70–1.83	<0.001	1.44	0.02	1.39–1.48	<0.001	1.17	0.01	1.15–1.2	<0.001	1.06	0.01	1.04–1.07	0.03
2019	2.13	0.04	2.05–2.22	<0.001	0.43	0.20	0.03–0.83	0.049	1.74	0.03	1.68–1.80	<0.001	1.45	0.02	1.40–1.49	<0.001	1.20	0.01	1.18–1.23	<0.001	1.06	0.01	1.05–1.08	<0.001

HSA: health service area.
HRR: hospital referral region.

assessed using linear regression models with standard errors clustered at the provider level to account for within-provider error correlations. If the provider had only one site, then the site dispersion was zero. Changes in the number of gynecologic oncologists, unique practice sites, number of practice sites per gynecologic oncologist and site dispersion per gynecologic oncologist at each geographic region were assessed using linear regression models with geographic region fixed effects. Models with fixed effects were used because they allow us to control for omitted and unobservable characteristics at the geographic region level.

2.7. Secondary outcome analyses

To assess for changes in geographic access to gynecologic oncologists, linear regression models were used to assess for changes in the number of zip codes, HSAs, HRRs, and states containing a gynecologic oncology practice over time. In addition, for geographic regions (i.e. zip code, state, HSA, HRR) that contained a gynecologic oncology practice, the number of gynecologic oncologists and unique practice sites by geographic region were calculated for each year. Additional secondary outcomes and analyses included the numbers of unique types of services, unique Medicare beneficiaries and amount paid by Medicare per gynecologic oncologist and the change associated with increasing number of practice sites and site dispersion (Supplement).

All statistical tests were considered significant at $p < 0.05$. Importantly, because of the large sample size of our data set, not all statistically significant differences are necessarily clinically significant differences. All analyses were performed and all figures were created with Stata 15.0 [23]. This study was reviewed by the University of Pennsylvania institutional review board and was determined to be exempt.

3. Results

3.1. Descriptive review of population

From 2015 to 2019, there were 1328 unique gynecologic oncologists in our sample, with a total of 5774 physician-year observations. The number of gynecologic oncologists, practice sites, and geographic regions containing a gynecologic oncology practice in the US by year are presented in Table 1.

3.2. Primary outcome

While there was an increase in the number of gynecologic oncologists over the study period (1088 in 2015 to 1157 in 2019), the trend was not statistically significant ($p = 0.06$; Table 1). Between 2015 and 2019, there was a significant increase in the number of practice sites (881 to 1416, $p = 0.03$) in the US (Fig. 1). The mean number of practice sites per gynecologic oncologist increased significantly between 2015 and 2019 (1.64 versus 2.13, $p < 0.001$; Table 2). The magnitude of the change in the number of practice sites per gynecologic oncologist was largest between 2017 and 2018 (1.55 to 2.19). The distribution of number of practice sites per gynecologic oncologist is shown in Fig. 2. The site dispersion also increased significantly between 2015 and 2019 (0.03 miles versus 0.43 miles, $p = 0.049$; Table 2).

Over the study period, the mean number of zip codes, HSAs, and HRRs per gynecologic oncologist also increased significantly (Table 2). The mean of the number of practices sites per gynecologic oncologist increased significantly from 2015 to 2019 at the zip code (2.08 versus 2.79, $p < 0.001$), HSA (1.98 versus 2.7, $p < 0.001$), HRR (1.88 versus 2.5, $p < 0.001$), and state levels (1.75 versus 2.35, $p < 0.001$; Table 3). Similarly, the mean of the site dispersion (miles) per gynecologic oncologist also increased significantly at the zip code (0.38 versus 2.10, $p < 0.001$), HSA (0.21 versus 1.84, $p < 0.001$), HRR (0.21 versus 2.78, $p = 0.002$), and state (−0.00 versus 5.06, $p = 0.04$) levels (Table 3).

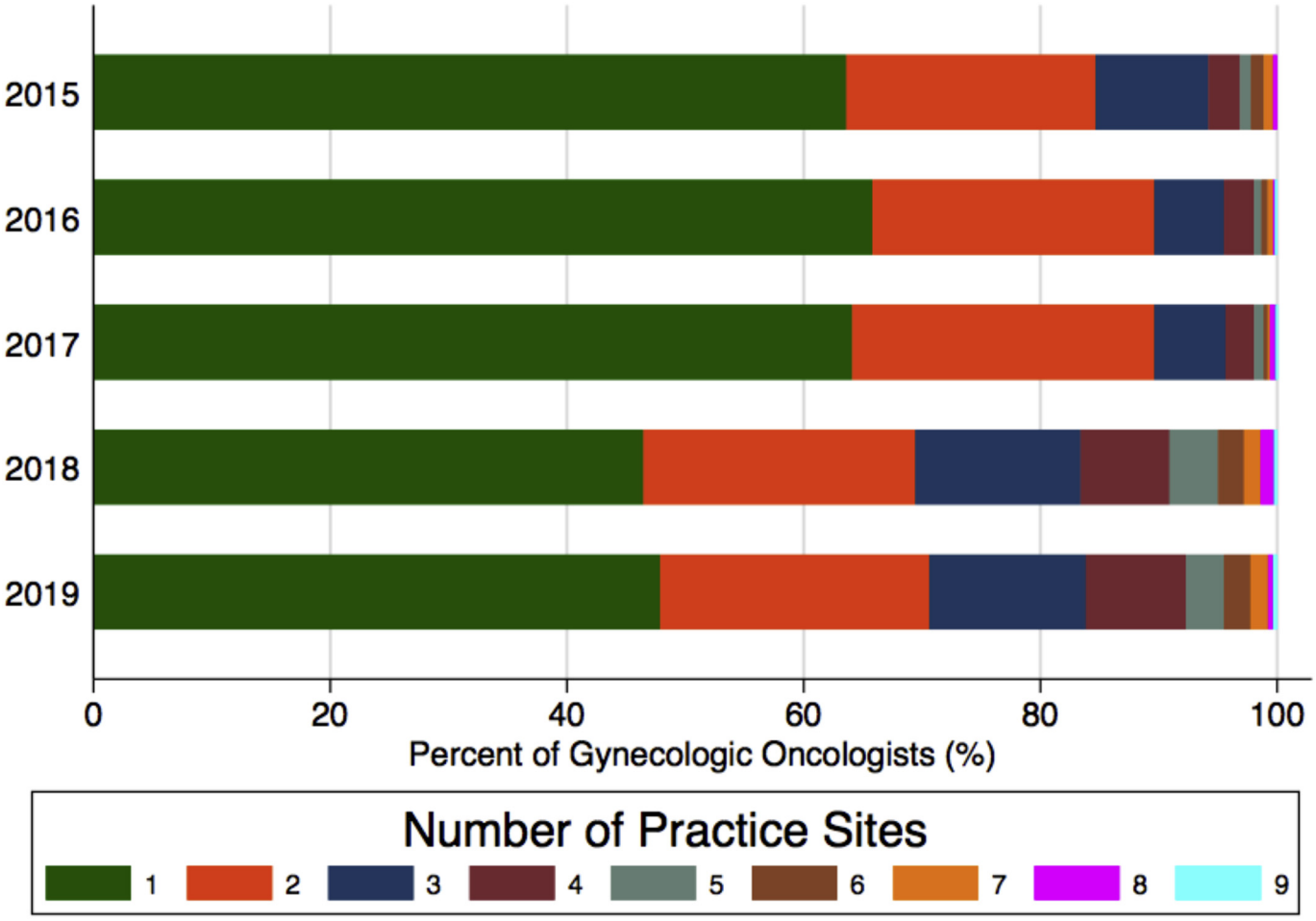

Fig. 2. Distribution of the number of practice sites per gynecologic oncologist per year, 2015–2019.

Table 3
Trends in the number of gynecologic oncologists (GO), number of unique practice sites (PS), PS per GO and site dispersion per GO by geographic region, 2015–2019.

Year	Zip code				HSA				HRR				State			
	Mean	SE	95% CI	*p*-value	Mean	SE	95% CI	*p*-value	Mean	SE	95% CI	*p*-value	Mean	SE	95% CI	*p*-value
Number of gynecologic oncologists																
2015	2.06	0.03	1.99–2.12	REF	2.92	0.05	2.83–3.01	REF	5.42	0.08	5.27–5.58	REF	22.31	0.26	21.80–22.81	REF
2016	2.03	0.03	1.97–2.09	0.56	2.98	0.04	2.89–3.06	0.37	5.71	0.08	5.56–5.87	0.01	23.30	0.25	22.80–23.80	0.006
2017	2.06	0.03	2.01–2.12	0.90	3.08	0.04	2.99–3.17	0.01	5.82	0.08	5.67–5.98	<0.001	24.05	0.25	23.55–24.55	<0.001
2018	2.14	0.03	2.09–2.19	0.06	3.21	0.04	3.13–3.29	<0.001	5.89	0.08	5.74–6.04	<0.001	23.79	0.25	23.29–24.29	<0.001
2019	2.14	0.03	2.09–2.19	0.05	3.32	0.04	3.24–3.4	<0.001	6.14	0.08	5.99–6.3	<0.001	24.24	0.25	23.74–24.74	<0.001
Number of unique practice sites																
2015	1.31	0.03	1.26–1.36	REF	1.91	0.06	1.79–2.03	REF	3.88	0.15	3.58–4.16	REF	17.26	0.95	15.39–19.13	REF
2016	1.29	0.02	1.24–1.33	0.52	1.98	0.06	1.86–2.09	0.44	4.15	0.15	3.86–4.43	0.19	18.5	0.94	16.65–20.35	0.36
2017	1.31	0.02	1.27–1.36	0.89	2.08	0.06	1.96–2.19	0.05	4.28	0.14	3.99–4.56	0.05	18.99	0.94	17.14–20.84	0.2
2018	1.46	0.02	1.43–1.50	<0.001	2.76	0.05	2.66–2.87	<0.001	6.22	0.14	5.94–6.50	<0.001	27.73	0.94	25.89–29.58	<0.001
2019	1.49	0.02	1.45–1.52	<0.001	2.84	0.05	2.73–2.94	<0.001	6.28	0.14	6.00–6.56	<0.001	27.85	0.94	26.00–29.70	<0.001
Mean number of practice sites per gynecologic oncologist																
2015	2.08	0.04	2.00–2.16	REF	1.98	0.04	1.9–2.07	REF	1.88	0.06	1.77–1.99	REF	1.75	0.07	1.62–1.87	0.50
2016	2.09	0.04	2.02–2.16	0.92	1.98	0.04	1.9–2.06	0.96	1.84	0.06	1.73–1.95	0.59	1.68	0.06	1.55–1.81	0.94
2017	2.10	0.04	2.03–2.17	0.71	2.02	0.04	1.94–2.10	0.55	1.81	0.05	1.70–1.92	0.37	1.74	0.06	1.6–1.87	<0.001
2018	2.84	0.03	2.78–2.90	<0.001	2.72	0.04	2.64–2.79	<0.001	2.50	0.05	2.4–2.61	<0.001	2.43	0.06	2.31–2.56	<0.001
2019	2.79	0.03	2.73–2.85	<0.001	2.7	0.04	2.62–2.77	<0.001	2.5	0.05	2.39–2.60	<0.001	2.35	0.06	2.23–2.48	<0.001
Mean site dispersion per gynecologic oncologist (Miles)																
2015	0.38	0.32	−0.26-1.00	REF	0.21	0.34	−0.46-0.88	REF	0.21	0.6	−0.96-1.39	REF	−0.00	1.77	−3.49-3.48	REF
2016	0.46	0.0.3	−0.12-1.03	0.85	0.32	0.32	−0.31-0.96	0.81	0.15	0.59	−1.02-1.31	0.94	0.01	1.75	−3.43-3.45	1
2017	0.50	0.29	−0.07-1.07	0.77	0.34	0.32	−0.29-0.96	0.79	0.23	0.59	−0.92-1.38	0.98	0.02	1.75	−3.43-3.46	0.99
2018	0.83	0.25	0.34–1.32	0.29	1.01	0.29	0.44–1.58	0.08	0.93	0.58	−0.20-2.06	0.39	0.76	1.75	−2.68-4.21	0.76
2019	2.10	0.26	1.60–2.60	<0.001	1.84	0.3	1.26–2.42	<0.001	2.78	0.58	1.65–3.92	0.002	5.06	1.75	1.62–8.50	0.04

HSA: health service area.
HRR: hospital referral region.

3.3. Secondary outcomes

Between 2015 and 2019, there was a significant increase in the number of zip codes (642 to 984, $p = 0.03$), HSAs (404 to 536, $p = 0.04$), and HRRs (218 to 230, $p = 0.03$; Fig. 1) that contained a gynecologic oncology practice. There was no significant change in the number of states that contained a gynecologic oncology practice over the study period (50 to 51, $p = 0.18$; Table 1). In 2015, Wyoming was the only state without a gynecologic oncologist. The number of gynecologic oncologists per zip code did not change significantly (2.14 versus 2.06, $p = 0.05$), while the number of gynecologic oncologists per HSA (2.92 versus 3.32, $p < 0.001$), HRR (5.42 versus 6.14, $p < 0.001$) and state (22.31 versus 24.24, $p < 0.001$) increased significantly between 2015 and 2019 (Table 3). The number of unique practice sites per zip code (1.31 versus 1.49, $p < 0.001$), HSA (1.91 versus 2.84, $p < 0.001$), HRR (3.88 versus 6.28, $p < 0.001$) and state (17.26 versus 27.85, $p < 0.001$) increased significantly over the study time (Table 3).

4. Discussion

From 2015 to 2019, there was a significant increase in the number of gynecologic oncologist practice sites, as well as the number of zip codes, HSAs, and HRRs containing a gynecologic oncologist practice site, despite no statistically significant change in the number of gynecologic oncologists. We observed increases in the number of gynecologic oncology practice sites per HRR across all regions of the country, suggesting that the finding is not driven by a significant change in a single geographic region. Furthermore, there was a significant, albeit discontinuous, increase in the number of practice sites per gynecologic oncologist and the site dispersion per gynecologic oncologist. The discontinuous pattern of these results could represent a real change in practice patterns, mergers of large practices, or artifacts within the dataset, such as changes in how the data are coded. These results confirm our hypotheses that there is an increasing trend in the number of practice sites per gynecologic oncologist and in the geographic area containing gynecologic oncologist practices over time. In other words, over this time period, gynecologic oncologists are working at more sites across wider geographic regions.

While local practice sites may provide patients with access to high-volume cancer centers and gynecologic oncologists, it is also possible that improved geographic access to gynecologic oncologists may not mean improved access to high quality cancer care. First, patients may not have access to the full range of cancer care (i.e. surgery, chemotherapy and radiation oncology) at a local practice site. Second, while receiving care from a high-volume physician is associated with higher quality care [3,4,6], receiving care in a high-volume hospital is also important [5,7,24]. Most adults in the US perceive that the care at a small hospital is improved after affiliation with a large hospital [25], even though the impact of an affiliation with a large hospital on the care provided by a small hospital is unclear. Third, insurance networks may limit a patient's ability to access a gynecologic oncologist, despite geographic proximity. In 2018, as many as 27% of Health Insurance Marketplace plans in the US lack access to gynecologic oncologist specialists in their networks [26]. Fourth, improved geographic access does not necessarily improve access to care for disadvantaged and vulnerable communities. Even during times of geographic growth within the health care system, disadvantaged neighborhoods are more likely to lose health care facilities [27]. In addition, those living in neighborhoods farther from cancer hospitals are more likely to be below the federal poverty level [28]. Relationships between geographic access to cancer care and sociodemographic composition of neighborhoods or patient panels may be better characterized using Medicaid or private insurance claims data.

Despite its unknown impact on quality of care, improving geographic access to gynecologic cancer specialists may be beneficial to some patients. Multiple studies have shown that distance from site of care is associated with lower likelihood of completing treatment [12,13] and worse survival outcomes [29]. It is possible that by reducing a patient's distance to care, her likelihood of completing treatment may improve. Patients may also prefer to receive care closer to home. Most ovarian cancer patients prefer not to travel to a referral center, even at the cost of potential survival benefits [30]. Traveling less to receive care may improve a patient's cancer care experience and, potentially, treatment compliance and completion.

Practicing at multiple sites may have implications for physicians as well. With up to one third of gynecologic oncologists experiencing burnout [31,32], managing practices at multiple sites may contribute to risk factors for burnout, such as job stress and challenges with work-life balance [33]. While there is limited evidence about the roles of commute time and number of clinic sites in the development of burnout among gynecologic oncologists, a recent study of hand surgeons found that lower burnout rates were associated with visiting only one facility per week and lower commute time [34]. Further research is needed to better understand how the consolidation and regionalization of gynecologic oncology practices may contribute physician burnout and wellness.

Our study had several limitations. First, the results are not generalizable to gynecologic oncologists who do not bill Medicare. However, given that almost half of women with gynecologic malignancies are eligible for Medicare, we are confident that most gynecologic oncologists bill FFS Medicare and are included in our data. Second, we identified a potential for misclassification bias of 10%. Although we detected a non-trivial amount of misclassification by specialty, it is not clear how this would have biased our results. Third, our data did not allow us to identify the gynecologic oncologist's primary practice site, how time is divided among multiple sites, or types of services provided at each site. We are therefore especially limited in our interpretation of site dispersion, as we cannot determine how far a physician is regularly commuting. Fourth, it is possible that there were changes in how the data were coded or collected over the time period, which could bias the results. However, this is unlikely given that Physician Compare has not changed its data source or verification methods since 2013 [35]. Finally, although large secondary data sets have advantages, we cannot verify the accuracy of all data elements. However, the rate of errors in practice site location or specialty would have to be large and changing over time to affect our main results.

In this study, we found that between 2015 and 2019, there has been a positive trend in the number of practice sites per gynecologic oncologist, with a corresponding increase in the number of geographic regions containing a gynecologic oncology practice. Improvements in geographic access to gynecologic oncologists may represent improved access to care for many women in the US, but its effect on patient experience, quality of care, physician wellbeing, and geographic disparities and inequities is unknown. As gynecologic oncology practices adapt to a dynamic health care system, further research is needed to understand how structural practice changes impact high quality cancer care.

Author contribution

KHC contributed to the conceptualization, data curation, formal analysis, methodology, project administration and writing - original draft. GPK, RG, MMS, NL, RB and EK contributed to the conceptualization, methodology and formal analysis. JEB, AH and MM contributed to the formal analysis. All authors contributed to the writing - review & editing.

Declation of Competing Interests

JB reports grants from Pfizer, UnitedHealth Group, Embedded Healthcare, and Blue Cross Blue Shield of North Carolina. JB reports personal fees from UnitedHealthcare, CMS, NCCN, Optum, and CVS Health.

RB reports personal fees from AstraZeneca, Tesaro, Genentech/Roche, Myriad, Agenus, Regeneron, Janssen, Merck, Morphotek, and VBL Therapeutics. EK reports grants from Tesaro. KHC, GK, RG, MS, NL, and AH have no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ygyno.2020.10.030.

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