Gender variation in Medicare utilization and payments in gynecologic oncology

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HIGHLIGHTS

- Using the POSPUF and POS NPI data files, we examined reimbursements to gynecologic oncologists in the year 2015.
- Male providers rendered 23% more services and received 35% more in median CMS reimbursement than female providers.
- There was a gender gap for mid-career providers, with males receiving 63% more than females with equivalent experience.
- Female providers with <10 years of experience see a smaller subset of new patients than their male colleagues.

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ABSTRACT

Objectives. The Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File (POSPUF) and Medicare Physician and Other Supplier National Provider Identifier (POS NPI) Aggregate Report are publicly available files from the Center for Medicare and Medicaid Services that include payments to providers who care for fee-for-service Medicare recipients. The aim of this study was to analyze variability in gynecologic oncologists' Medicare reimbursements, with attention to differences in provider gender and time in practice.

Methods. The 2015 POSPUF and POS NPI were analyzed with respect to gynecologic oncologists. We searched external publicly available data sources to confirm subspecialty and to determine each provider's number of years in practice. Evaluation and management (E&M) and procedure/surgery codes were analyzed; drug delivery codes were excluded due to variability in billing by facility/hospital.

Results. The POS NPI file included 733 gynecologic oncologist providers receiving $55,626,739 in total payments. Female providers comprised 39% of gynecologic oncologists and received 31% of reimbursements (30% of E&M reimbursements and 24% of surgical reimbursements). During the first ten years in practice, female providers comprised 58% of providers and accounted for 52% of reimbursed services, compared to 38% of providers/ 26% of reimbursed services (11–20 years), and 18% of providers/19% of reimbursed services (>20 years).

Conclusion. Male gynecologic oncologists perform more Medicare services than their female counterparts. There is a comparable number of services performed between genders among both the most senior and the most junior providers, with a gender gap in services and reimbursements among mid-career providers.

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1. Introduction

There are increasing numbers of women in medicine, with females representing 50.7% of 2017 medical school matriculants, a 3.2% increase from 2016 [1–5]. In 2015, females comprised 83% of Obstetrics and Gynecology residents and fellows, the highest proportion of female providers among all specialties [6]; trainees in the other surgical specialties are between 14.8% and 38.3% female [6]. Within gynecologic oncology, females comprise 40% of Society of Gynecologic Oncology (SGO) membership [7]. Published studies have indicated coincidence of training with the childbearing years and family demands, lack of same-sex mentorship, and active gender discrimination as reasons for

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the relative paucity of female surgeons [2–5]. With more women entering gynecologic oncology, one study showed that women in this sub-specialty lag behind men in their early academic careers but not in their late careers [4].

The Center for Medicare and Medicaid Services (CMS) has released a series of data files that summarize utilization of and reimbursement for services provided to Medicare beneficiaries as part of an ongoing effort to increase healthcare transparency [8,9]. The Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File (POSPUF) is a publicly available file that includes payments by line item to individual physicians who care for fee-for-service Medicare recipients [10]. Analysis of POSPUF has been previously reported in several other specialties, including radiation oncology, otolaryngology, urology, and neurology [11–14]. The Medicare Physician and Other Supplier National Provider Identifier Aggregate Report (POS NPI), a supplement to the POSPUF, contains information on aggregate Medicare reimbursements to individual providers. In addition to providing data to investigate novel methods of value-based healthcare, this file provides a window into the gender variability within the field.

The aim of this study was to describe variability in gynecologic oncologists' Medicare payments and utilization, with attention to differences based on provider gender and time in practice.

2. Methods

2.1. Physician payment data sets

Medicare fee-for-service data was obtained from the CMS POSPUF. POSPUF contains data on Medicare Part B payments made in 2015. The file includes provider names, National Provider Identifier (NPI) codes, and Healthcare Common Procedure Coding System (HCPCS) codes. We used publicly available data from Doximity and healthcare4ppl.com to reference providers listed in POSPUF to confirm gynecologic oncology subspecialty and the number of years in gynecologic oncology practice in 2015. Physicians who were not confirmed as practicing gynecologic oncologists were removed prior to analysis. Of the original 913 providers, 89 providers were eliminated from the file through this process, leaving 824 providers for whom fee-for-service data was examined. The POSPUF file omits any lower volume services where 10 or fewer Medicare beneficiaries received care by a particular physician.

The Medicare POS NPI, a supplement to the POSPUF data file, contains information in aggregate on utilization, payments, and submitted charges organized by National Provider Identifiers. This file was used because it includes reimbursements that are excluded from the POSPUF dataset, specifically reimbursements for line items where 10 or fewer Medicare beneficiaries received care by a particular physician. The POS NPI dataset included aggregate medical Medicare reimbursement for 733 of the 824 providers in the POSPUF file; the remaining 91 physicians were not included because they had aggregate Medicare reimbursement data but this data did not differentiate between medical and drug Medicare reimbursements.

2.2. Reimbursement and services

The Medicare POS NPI dataset was used to determine Medicare reimbursements and services per physician. Quartiles based on reimbursement were created, with an equal number of physicians within each quartile. The POSPUF dataset was used to determine types of services provided by individual physicians. For each provider, the specific HCPCS codes used, number of services per code, and average Medicare payment were available. A minority of providers had any billing codes for labs (11%), drugs (16%), and imaging (5%) due to variations in facility-based billing; therefore, only evaluation, management, and pro-cedure/surgery codes were included in the analysis.

2.3. Evaluation and management

In order to examine use of evaluation and management codes for patterns related to gender and years in practice, the POSPUF dataset and HCPCS codes were used to determine the number of new patient visits (codes: 99201, 99202, 99203, 99204, 99205) and established patient visits (codes: 99211, 99212, 99213, 99214, 99215).

2.4. Surgery and procedures

Surgical and procedural codes were identified from the dataset. In order to further examine use of specific surgical and procedural codes for patterns related to gender over a range of surgical complexity, the POSPUF dataset and HCPCS codes were used to determine the number of radical hysterectomy codes (58210, 58548) and simple hysterectomy codes (58150, 58571, 58552), utilized for providers who performed at least 10 of each coded procedure reimbursed by Medicare. The number of providers who provided at least 10 of the coded procedures and the average Medicare reimbursements per procedure per provider were also analyzed.

2.5. Statistical analysis

Statistical analyses were performed using SAS v. 9.4 (SAS Institute Inc. Cary, NC). Continuous variables were compared using Wilcoxon rank-sum tests. A general linear model was used to test the interaction of gender by years of experience when comparing reimbursement amounts. Since the interaction term was non-significant it was dropped from the model when testing the main effects for gender and years of experience. Plots were created using Microsoft Excel v. 16.16 (Microsoft Corporation. Redmond, WA).

This study has been declared exempt by the Duke University IRB.

3. Results

3.1. Overview

The POS NPI file included 733 confirmed gynecologic oncology providers who received a total of $55,626,740 in Medicare compensation in 2015. Females comprised 39% of the providers and accounted for 31% of Medicare reimbursement. The median reimbursement was $60,277 (IQR $35,081, $94,362) per provider, with the median female provider Medicare reimbursement $49,442, and the median male provider Medicare reimbursement $66,944 ($p < 0.001$) (Table 1). The 4th (lowest reimbursement) quartile was composed of 46% female providers; 3rd quartile – 47% female; 2nd quartile – 36% female; 1st quartile – 25% female. The median number of medical services performed was 418 per provider, with females performing a median of 373 medical services and males performing a median of 459 medical services ($p < 0.001$). Female providers received a median of $123 per medical service; males received a median of $133 per medical service.

Table 1
Overview of POS NPI data[a].

	Male	Female	p-Value
Number of providers	451	282	–
Total reimbursement	$38,639,188	$17,087,551	–
Median number of services	459	374	<0.001
Median payment per service	$133	$123	0.37
Median Reimbursement			
Overall	$66,944	$49,442	<0.001
0–10 years of experience	$67,841	$50,298	
10–20 years of experience	$71,832	$44,142	
20+ years of experience	$62,227	$46,978	

[a] Generated from the POS NPI (Medicare Physician and Other Supplier National Provider Identifier) data, which included all medical Medicare reimbursements for providers. POS NPI.

3.2. Service variation with different years of experience

Table 1 depicts total reimbursements by gender. For gynecologic oncology providers who had been in practice for >20 years, females comprised 18% of the providers, provided 19% of the services rendered, and received 16% of Medicare reimbursements. These providers received a median Medicare reimbursement of $61,727, with female providers receiving a median Medicare reimbursement of $46,978 and male providers, $62,227 (Fig. 1). Based on work experience, male providers in practice for >20 years were reimbursed, on average, 32% more than female providers with the same amount of experience (Table 1).

For gynecologic oncology providers who had been in practice between 10 and 20 years, females composed 38% of the providers, provided 26% of the services rendered, and received 27% of Medicare reimbursements. These providers received a median Medicare reimbursement of $63,018, with female providers receiving a median Medicare reimbursement of $44,142 and male providers, $71,832 (Fig. 1). Male gynecologic oncologists in practice between 10 and 20 years were reimbursed 63% more than female providers with the same work experience (Table 1).

For gynecologic oncology providers who had been in practice for <10 years, females composed 58% of the providers, provided 52% of the services rendered, and received 52% of Medicare reimbursements. These providers received a median Medicare reimbursement of $55,458, with female providers receiving a median Medicare reimbursement of $50,298 and male providers, $67,841 (Fig. 1). Male providers in practice for up to 10 years were reimbursed, on average, 34% more than female providers with the same amount of experience (Table 1).

Overall, in a general linear model, the test of the interaction of gender by years was not significant ($p = 0.10$). After dropping the interaction term from the model, the reimbursement paid to males is higher than to females, independent of years of experience ($p < 0.001$).

However, the reimbursement paid for years of experience did not reach statistical significance ($p = 0.051$) (Fig. 1).

3.3. Evaluation and management

Medicare provided reimbursement for 252,774 outpatient visits (HCPCS codes 99201–99205 and 99211–99215) to gynecologic oncologists in 2015. Female providers performed 30% of the E/M services and were reimbursed for 30% of the total billing codes (Table 2).

The most commonly billed new patient code overall and within each age and gender bracket was 99205 (Fig. 2a). Overall, 64% of new patient services performed by female providers were billed as 99205; 58% of new patient services performed by male providers were billed as 99205. For providers with <10 years, females performed 32% of new patients visits, while males performed 68% of new patients visits; 10–20 years – 30% females/70% males, 20+ years of experience – 15% females/85% males.

The most commonly billed established outpatient code overall and within each age and gender bracket was 99214 (Fig. 2b). Overall, 49% of established patient visits performed by female providers and 49% of established visits performed by men were billed at 99214. For providers with <10 years in practice, females performed 54% of established patients visits, and males performed 46% of established patient visits; 10–20 years – 27% females/73% males, 20+ years of experience – 16% females/84% males.

3.4. Surgery and procedures

Female providers performed 24% of surgical procedures and were reimbursed for 22% of the surgical volume (Table 2).

For radical hysterectomy codes, 7 female providers had line items; they performed a median of 14 procedures and received a median Medicare payment amount of $4000 per procedure. 36 male providers
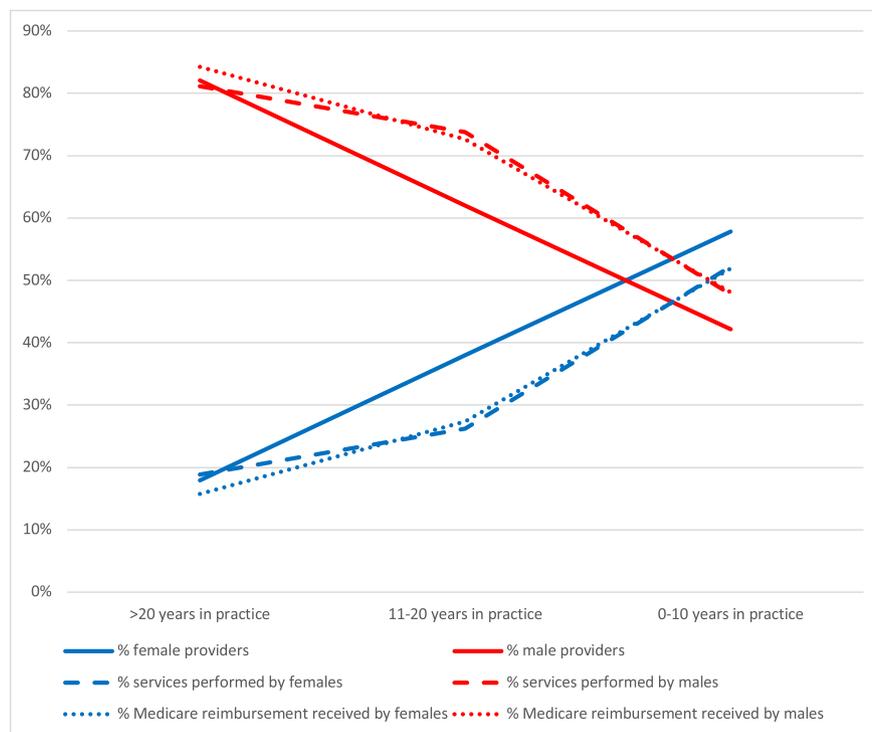

Fig. 1. Provider composition and services performed across different age brackets. For providers with 0–10 years of experience, women comprised 58% of providers and accounted for 52% of reimbursed services, compared to 38% of providers/26% of reimbursed services (11–20 years), and 18% of providers/19% of reimbursed services (>20 years). Data shown here is from the POS NPI dataset.

Table 2
Service gender variation based on the POSPUF data[a].

Parameter	Total	Male	Female
Number of providers	824	507 (62%)	317 (38%)
Patient visits			
Number of services	252,774	175,873 (70%)	76,901 (30%)
Reimbursement	$18,661,276	$12,925,728 (69%)	$5,735,548 (31%)
Surgical and procedural volume			
Number of services	12,880	9742 (76%)	3138 (24%)
Reimbursement	$7,806,998	$6,053,859 (78%)	$1,753,139 (22%)

[a] Generated from the POSPUF (Medicare Provider Utilization and Payment Data: Physician and Other Supplier Public Use File) data, which provided detailed granularity of types of services reimbursed.

had line items; they performed a median of 15 procedures per provider and received a median payment of $5092 per procedure. For simple hysterectomy codes, 108 female providers had line items, and they performed a median of 16 procedures and received a median Medicare payment amount of $636 per procedure; 232 male providers had line items, and they performed a median of 19 procedures per provider and received a median payment of $643 per procedure. See Supplemental Table 1 for breakdown by individual HCPCS code.

4. Discussion

Even when accounting for the ongoing increase in the proportion of female physicians, gynecologic oncology has seen a marked rise in female surgeons compared to other surgical specialties, which may be a result of increased female mentors and decreased gender bias in the field [2,4,5]. According to the 2015 SGO practice survey, females comprised 40% of membership, 66% of gynecologic oncologists with fewer than 5 years of experience, and 16% of gynecologic oncologists with 26 years or more of experience [7]. We similarly found using the POSPUF file that at the senior level (20+ years of experience), females comprised 18% of providers reimbursed for services. However, this large gender gap disappears for more junior physicians (<10 years of experience), with females comprising 58% of providers.

Our study found that in 2015, male gynecologic oncology providers received 35% more in median Medicare reimbursements than their female colleagues. These results are in line with large gender differences

a. Evaluation and Management coding of new patients
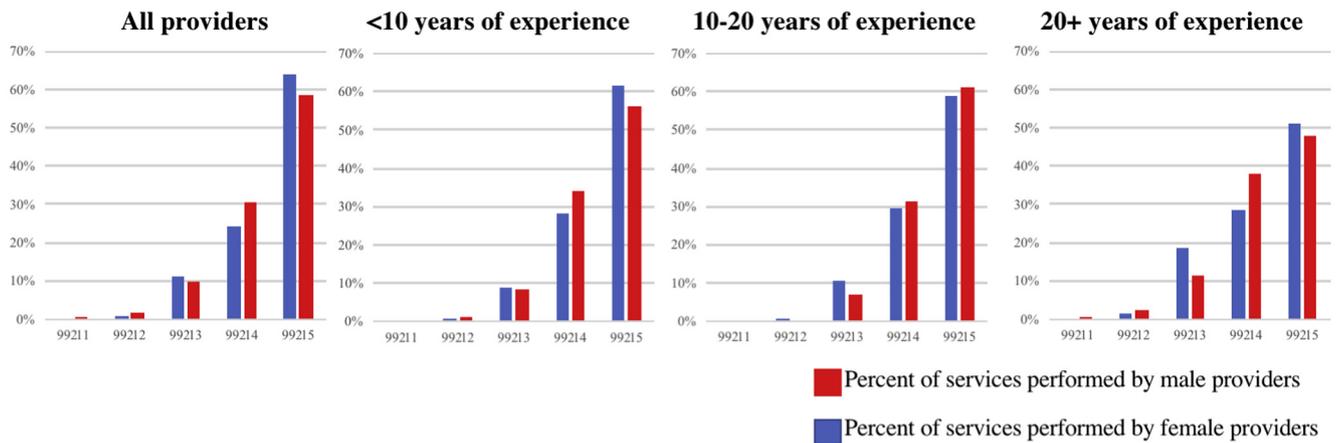
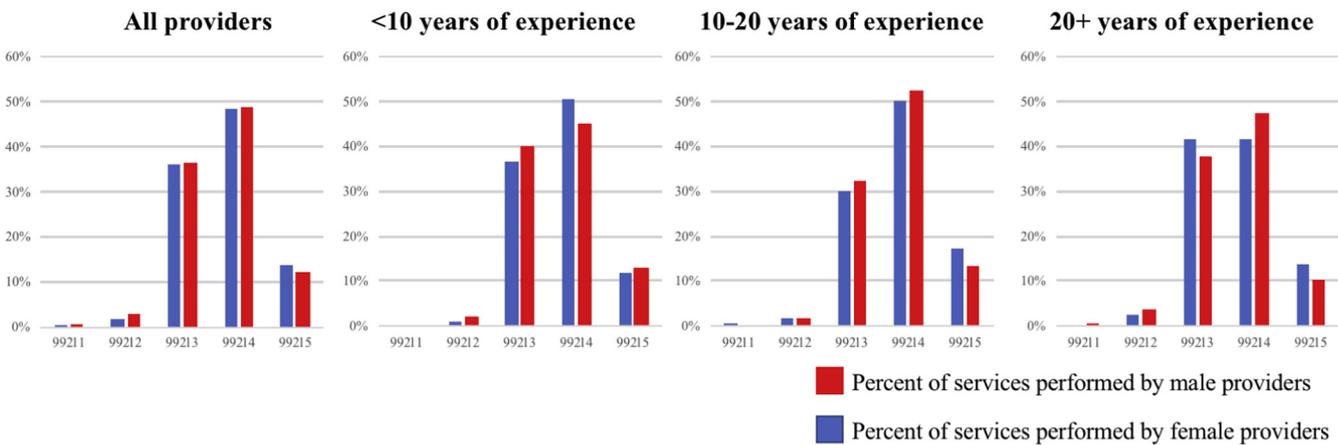## b. Evaluation and Management coding of established patients

Fig. 2. Evaluation and Management Services. Fig. 2a. The most commonly billed new patient code was 99205, with women performing 28% of new patient visits. New patient services performed by each gender were billed as 99a at the following rates: <10 years of experience–62% female/56% male, 10–20 years–59% female/61% male, 20+ years–51% female/48% male. Fig. 2b. The most commonly billed established patient code was 99214, with women performing 30% of the new patient visits. Women with 0–10 years of experience performed 32% of new patient visits and 54% of established patient visits. Established patient services performed by each gender were billed as 99214 at the following rates: <10 years of experience–51% female/45% males, 10-20 years–50% female/52% male, 20+ years–42% female/47% male. Data shown here is from the POSPUF dataset.

seen in personal income noted in the concurrent 2015 SGO practice survey, in which male gynecologic oncologists reported earning on average 43% more than females [7]. The practice survey did not stratify income results based on years in practice, making interpretation of gender differences difficult. In our study, the difference in CMS reimbursement and services provided between genders is especially prominent for mid-career physicians with 10–20 years of experience, with males reimbursed 63% more than female providers with the same work experience. This difference is less pronounced for providers with <10 years of experience and >20 years of experience, with male providers reimbursed 34% and 32% more than female providers, respectively, with the same amount of work experience. Similarly, female SGO members were less likely to report an increase in income over the previous 5 years than males (23% vs 44%). A study by Vu et al. analyzing POSPUF with regard to Radiation Oncology found that male providers received 51% more in median Medicare reimbursement than their female colleagues [14]. The authors attributed this difference to younger female provider age and a higher proportion of female providers working part time [14,15]. There are a number of additional explanations for why this gap in reimbursements and services provided exists. For example, our study found that male providers provided more surgical procedures as a whole compared to their female peers. Additionally, a larger proportion of their surgical case load were open procedures, which are often reimbursed at a higher rate, as opposed to minimally invasive procedures. Some studies suggest that female providers tend to spend more time attending to family responsibilities than men, and this may partially explain why women provide proportionally fewer services than their male colleagues [2–5]. Another hypothesis is that women are more likely to pursue academic versus private practice. While the SGO survey showed no statistical difference in type of practice (private vs academic) by gender overall, this data was not stratified by age and did not differentiate between clinical and research tracks [7]. A recent study demonstrated that 52% of publications in gynecologic oncology had female first-authors in 2015, compared to 24% in 2000 [16]. Other studies indicate that women in academia spend more time teaching and on committees than men, which could contribute to the difference in CMS reimbursements and services provided [17]. This compilation of factors could indicate that women may choose to build a practice that it not based on RVUs, and that this diversification of work between patient care, education, and research, while valuable, would not be reflected in Medicare reimbursement.

In our study, female providers were more likely to use a higher level billing code for new patient visits than males. One possible reason for this outcome is differences in billing education and practices. Multiple studies in other medical specialties have demonstrated that formal billing education decreases note devaluation and increases mean level billed [18–20]. However, this outcome is in line with the 2015 SGO survey, which showed that female gynecologic oncologists spent more time in clinic than males (26.6 h/week vs 22 h/week), but saw fewer patients on average (30 vs 36 patients/week). This time difference between genders has been studied in the literature, and a previous meta-analysis demonstrated that female proviers are more likely to engage in more patient-centered communication and have longer patient encounters than their male colleagues [21]. This would account for a higher number of level 4 or 5 E&M codes as well as a lower number of services provided by women overall.

With regard to new patient visits, our study demonstrated that junior female providers see a proportionally smaller subset of new patients compared to their male colleagues. Female providers with <10 years of experience saw 54% of established patient visits but only 32% of new patients; male providers saw 46% of established patient visits and 68% of new patient visits. This difference was less prominent for female providers with 10–20 years of experience (30% new/27% established) and female providers with >20 years of experience (16% new/15% established). Similarly, females performed a smaller percentage of surgeries (24%), which could be a downstream effect of seeing

fewer new patients. These differences in new and established patient visits with junior providers likely contributes to the gap in Medicare reimbursements, and may suggest a gender-based referral bias. One study demonstrated that men are more likely than women to be viewed as competent by both men and women in STEM fields, which include science, technology, engineering, and mathematic fields, and this implicit bias may have a role in patient referrals to younger, less established specialists [22]. Another hypothesis is the existence of patient bias; a recent survey, *Patient Prejudice: When Credentials Aren't Enough,* demonstrated that women were more often than men to experience bias from patients related to their age (36% vs 23%) and gender (41% vs 6%) [23]. One possible solution to this bias is increased transparency. Some institutions provide monthly/quarterly reports that demonstrate how billing practices and the number of new/established patients of an individual provider compares to their anonymous peers. This may improve transparency, improve accurate billing, and identify deficiencies in adequate billing, especially if it also stratifies the billing practices by gender.

Our study is limited by several factors. First, the POSPUF and POS NPI datasets only encompass Medicare fee for service patients; therefore, only patients 65 and older who have Medicare are included. This population comprises only a subset of gynecologic oncology patients. Second, Medicare reimbursement data for medical services provided was not available for all gynecologic oncology providers within the POS NPI dataset because, while total Medicare payment was available in the file, some providers did not have data differentiating Medicare for medical services versus Medicare for drug charges. Additionally, while we were able to verify the practices of gynecologic oncologists listed in the file, we may have failed to identify others. For example, one practicing gynecologic oncologist at our institution was mislabeled in the POSPUF file as a general obstetrician-gynecologist; we were not able to individually search the 9.47 million lines in the file to locate other gynecologic oncologists whose specialty may have been misassigned. Third, the POSPUF dataset only accounts for services for which there are >10 beneficiaries per provider, which skews the surgical and evaluation/management data toward high volume providers. We attempted to overcome this by cross matching the data with the POS NPI aggregate data, which does include all services provided by individual providers, but the POS NPI database did not include reimbursement information for 91 providers identified by POSPUF. Fourth, these datasets only captured reimbursement for one year, and as there is only data from 2012 to 2016, we are unable to capture longitudinal data. Lastly, we were unable to distinguish between physicians in private practice versus academia and full time versus part time physicians.

In conclusion, while male providers perform more Medicare services and therefore receive more in Medicare reimbursement, there is a trend toward equal provider composition between genders among providers in practice for <10 years. Notably, there are a comparable number of services performed between genders among both senior and junior providers, with the primary gap in Medicare services existing among mid-career providers. Further research investigating longitudinal direction of this gender gap in the field is necessary.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ygyno.2019.06.007.

Authors' contribution

Davidson contributed hypothess generation and critical evaluation of tables, figures, and manuscript wrting.

Declaration of Competing Interest

The SL, AP, GB, JE, AL, JF, BD, JC, and LH declare no relevant conflict of interest with regard to this study.

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