International Urogynecology Journal (2019) 30:1153–1161
https://doi.org/10.1007/s00192-018-3636-0

ORIGINAL ARTICLE

National survey of urogynecological practice patterns among United States OB/GYN oral board examinees in different practice settings

Andrey Petrikovets[1,2] · Abigail Davenport[2] · Sherif A. El-Nashar[1] · David Sheyn[1,2] · Jeffrey Mangel[2] · Sangeeta T. Mahajan[1]

Received: 9 December 2017 / Accepted: 8 March 2018 / Published online: 13 April 2018

Abstract

Introduction and hypothesis The current urogynecological surgical experience of recent OB/GYN graduates in different practice settings is unclear. The aim of this study was to evaluate differences in urogynecological surgical care between private practitioners (PPs) and other generalist OB/GYN oral board examinees.

Methods A total of 699 OB/GYN oral board examination examinees were administered a survey during board preparatory courses with a 70.7% response rate. The primary outcome was to determine differences in subjective reported performance of urogynecological surgery with and without apical support procedures (female pelvic medicine and reconstructive surgery, FPMRS, ± apical) between PP and generalists in other practice models (academic, managed care, other). Secondary outcomes included urogynecological case list reporting, referral patterns, and residency training.

Results A total of 473 surveys were completed; after excluding subspecialists, 210 surveys were completed by PP and 162 by individuals in other settings. 6.7% of PPs subjectively reported that they perform FPMRS + apical surgery compared with 4.3% of those in other practice settings ($p = 0.33$). Although 29.2% of PPs reported adequate FPMRS training in residency compared with 39.7% of those in other practice settings ($p = 0.04$), 53.6% of PPs reported that they refer patients with pelvic organ prolapse (POP), compared with 66.5% of those in other practice settings ($p = 0.013$). 38.9% of PPs report that they performed POP surgery compared with 27.8% of non-PPs ($p = 0.014$).

Conclusions Regardless of practice setting, surgical volumes are low and few general OB/GYN board examinees report that they perform comprehensive FPMRS ± apical support surgery. The practice environment may affect providers' management of patients with pelvic floor disorders.

Keywords Urogynecology · Trends · Survey · Private practice · Oral boards

Introduction

Pelvic organ prolapse (POP) and urinary incontinence are common conditions in women. In the USA, the number of women with more than one pelvic floor disorder is predicted to increase from 31 million in 2015 to 41 million by 2045 [1]. It is estimated that the number of women in the USA who undergo stress incontinence surgery will increase by 47% to 300,000 annual cases, and the number of surgeries for POP will increase by 47% to just over 250,000 cases by 2050 [2]. With this projected increased demand and the establishment of an Accreditation Council for Graduate Medical Education (ACGME)-accredited fellowship in female pelvic medicine and reconstructive surgery (FPMRS), it is important to consider the trends in urogynecological surgery among recently graduated generalist OB/GYN providers in different practice settings. It is unclear what clinical acumen and surgical volumes need to be maintained to manage the depth and breadth of urogynecological surgery.

The minimum threshold for performing vaginal hysterectomies at the completion of residency training in the USA is

✉ Andrey Petrikovets
andrepetrikovets@yahoo.com

[1] Department of Female Pelvic Medicine & Reconstructive Surgery, Urology Institute, University Hospitals Cleveland Medical Center, 11100 Euclid Avenue, Cleveland, OH 44106, USA

[2] Department of Urogynecology and Pelvic Reconstructive Surgery, MetroHealth Medical Center, 2500 MetroHealth Drive, Cleveland, OH 44109, USA

15 operations, and the minimum threshold for performing incontinence and pelvic floor surgery in the USA is 25 operations [3]. In evaluating residents performing vaginal hysterectomies using various rating scales, Jelovsek and colleagues noted that, on average, it takes trainees 21–27 vaginal hysterectomies to attain surgical competence [4]. Translating these numbers into independent clinical practice is challenging. In a database analysis of low-, intermediate-, and high-volume surgeons performing vaginal hysterectomies, high surgical volumes (>13 vaginal hysterectomies annually) were associated with lower perioperative morbidity than low surgical volumes (<5 vaginal hysterectomies annually) [5].

The current FPMRS experience of recent OB/GYN graduates in different practice settings is unclear. This study uses OB/GYN oral board examinees as a surrogate to gain an understanding of current urogynecological practice patterns among recent graduates. We subcategorized the candidates by type of practice pattern, as we hypothesized that different practice models might influence urogynecological practice patterns. Therefore, the purpose of this national survey was to analyze differences in comprehensive urogynecological surgical care, surgical volumes, practice patterns, and trends in FPMRS residency training among private practitioners (PPs) and other non-PP generalist OB/GYN oral board candidates.

Materials and methods

This is an IRB-exempt national survey of OB/GYN oral board examinees distributed at five commercial board preparatory courses in the USA from August 2016 to November 2016. The course administrator introduced the survey, informed candidates that it was anonymous and voluntary, and instructed candidates to use their gynecology oral board case lists to respond to some of the questions. The course administrator was not involved in the study in any other capacity (i.e., in the design, data analysis, or writing of the manuscript). Consent was implied by participation in the survey. The primary outcome was to determine differences in subjective reported performance of urogynecological surgery with and without apical support procedures (FPMRS ± apical) between PP and generalists in other practice models (academic, managed care, other). Performance of comprehensive FPMRS was defined as a "yes" or "no" response to whether or not a provider subjectively reported that they perform the combination of *all* of the following procedures: transvaginal hysterectomy, midurethral sling, anterior colporrhaphy, posterior colporrhaphy, and cystoscopy ± apical support. Subjective reporting was compared with providers' objective performance, which was based on the self-reported FPMRS ± apical surgeries on their American Board of Obstetrics and Gynecology (ABOG) OB/GYN oral board case lists. Case list verified reporting was evaluated in a similar fashion to subjective reporting; an affirmative response was considered when an examinee documented all of the following procedures on his or her case lists: transvaginal hysterectomy, midurethral sling, anterior colporrhaphy, posterior colporrhaphy, and cystoscopy ± apical support. Secondary outcomes included urogynecological case list reporting, referral patterns, and FPMRS residency training experiences between PPs and those in other practice settings. Satisfaction with FPMRS residency training was measured using a 0–10 numerical satisfaction scale with 0 indicating not satisfied and 10 indicating very satisfied. All of the data were self-reported by the examinees on survey forms and returned to the course administrators at the end of the day. The study coordinators did not personally view any examinee case lists.

Statistical analysis was performed using JMP (SAS Institute, Cary, NC, USA). Data were assessed for normality of distribution. Continuous variables were analyzed using Student's t test for normally distributed variables and the Mann–Whitney test for non-normally distributed variables. Categorical variables were analyzed using the Chi-squared test. All results yielding $p < 0.05$ were deemed statistically significant.

Results

A total of 669 OB/GYN oral board candidates attended five commercial board review courses, two in Los Angeles (CA, USA) and three in Baltimore (MD, USA). 473 (70.7%) surveys were completed, and 101 subspecialists (MFM, GYN ONC, FPMRS, Family Planning, MIGS) were excluded. 372 out of 669 surveys (55.6%) were completed by generalist OB/GYN oral board examinees. Of 372 generalist examinees, 210 (56.5%) were PPs and 162 (43.5%) were in other practice models (academic, managed care, military). Demographic data are presented in Table 1. The primary outcomes are presented in Table 2. Fourteen of those in PPs (6.7%) subjectively reported that they perform FPMRS + apical surgery compared with 7 of those in other practice settings (4.3%; $p = 0.33$). Upon exclusion of apical support surgery, 25 PPs (11.9%) compared with 14 others (8.6%) reported that they perform FPMRS ($p = 0.30$). Upon evaluation of case list reporting, 4 PPs (1.9%) noted that they performed FPMRS + apical surgery compared with 3 of those in other practice settings (1.9%; $p = 0.97$); 8 PPs (3.8%) performed FPMRS without apical support compared with 5 of those in other settings (3.1%) as documented on examinee case lists ($p = 0.71$). Furthermore, as depicted in Fig. 1, from the overall group

Table 1 Demographics

Category	Overall ($N = 372$)	Private practice ($N = 210$)	Nonprivate practice ($N = 162$)	p
Age	34.19 ± 3.14	33.77 ± 2.47	34.75 ± 3.78	0.02
Sex, female *n* (%)	326 (87.6)	191 (90.1)	135 (83.3)	0.03
Race, white *n* (%)	323 (65.0)	132 (65.2)	100 (64.1)	0.77
Years since graduation	2.47 ± 1.77	2.41 ± 1.37	2.55 ± 2.20	0.67
Current location type				
Urban	147 (39.7)	72 (34.4)	75 (46.6)	<0.001
Suburban	159 (43.0)	111 (53.1)	48 (29.8)	
Rural	63 (17.0)	25 (12.0)	38 (23.6)	
Other	1 (0.3)	1 (0.5)	0 (0.0)	
Residency region				
Midwest	74 (19.9)	38 (18.1)	36 (22.2)	0.10
Northwest	109 (29.3)	60 (28.6)	49 (30.2)	
Southeast	99 (26.6)	66 (31.4)	33 (20.4)	
Southwest	40 (10.8)	24 (11.4)	16 (9.9)	
West	46 (12.4)	21 (10.0)	25 (15.4)	
Other	3 (1.1)	1 (0.5)	3 (1.9)	
Residency type				
Academic	194 (52.2)	105 (50.0)	89 (54.9)	0.55
Community	79 (21.2)	49 (23.3)	30 (18.5)	
Comm-uni affil	96 (25.8)	55 (26.2)	41 (25.3)	
Other	3 (0.8)	1 (0.5)	2 (1.2)	

Data are *n* (% yes), mean ± standard deviation (sample size) unless otherwise mentioned

of 372 examinees, 5.7% reported that they perform FPMRS + apical support in contrast to 1.9% of examinees documenting these procedures on their case lists ($p < 0.001$). Similarly, of all examinees subjectively reported that they perform FPMRS − apical support surgery compared with 3.5% of examinees documenting this on their case lists ($p < 0.001$). Subjective reporting and case-list verified reporting differences for FPMRS ± apical support procedures remained significantly different ($p < 0.001$) when the overall data for 372 examinees was substratified into PP and in other practice settings.

Practice patterns and FPMRS experiences during residency are presented in Tables 3 and 4, respectively. Table 5 presents FPMRS and gynecologic surgical volumes and experience between PP and those in other practice settings. Of those subjectively reporting that they perform slings, PP reported that they 4.48 ± 3.92 slings per year compared to 4.51 ± 4.30 slings reported by those in other practice settings ($p = 0.76$); PP reported 3.38 ± 3.68 slings on their case lists compared to 3.07 ± 3.93 slings on the case lists of those in non-PP settings. Furthermore, of the oral board candidates who perform TVH, PP reported performing 4.90 ± 5.6 TVH per year compared to 4.92 ± 4.51 per year for those in non-PP settings ($p = 0.19$); PP had 3.09 ± 5.19 TVH on their case lists compared to a 3.43 ± 3.86 for those in non-PP ($p = 0.03$). More examinees in PP reported that they perform prolapse surgery compared with others. Of the examinees who reported that they perform prolapse surgery, 37% of PP and 45.5% of non-PPs reported performing apical prolapse surgery ($p = 0.36$). Of the examinees who do perform apical prolapse surgery, PP reported performing 3.13 ± 3.5 apical prolapse surgeries per year compared to 3.57 ± 3.9 surgeries per year for those in non-PP ($p = 0.4$); PP noted 2.21 ± 2.86 apical prolapse surgeries on their case lists compared with 2.84 ± 2.90 for those in non-PP ($p = 0.36$). Furthermore, of the examinees who perform prolapse surgery, 88.9% of PP and 88.6% of non-PPSs reported performing anterior repairs ($p = 0.97$). Of those that perform anterior repairs, PPs noted that they carrried out 3.51 ± 3.7 anterior repairs per year compared with 4.17 ± 3.7 anterior repairs per year for those in non-PP ($p = 0.12$); PP had 2.20 ± 2.47 anterior repairs on their case lists compared to 2.71 ± 2.71 for those in non-PP settings ($p = 0.33$). Finally, of the examinees who perform prolapse surgery, 87.7% of PP and 81.8% of examinees in non-PP settings perform posterior repairs ($p = 0.38$). PP that perform posterior repairs perform

Table 2 Subjective and case list female pelvic medicine and reconstructive surgery (*FPMRS*) reporting

Results	Private practice ($N = 210$)	Nonprivate practice ($N = 162$)	p
Subjective reporting FPMRS + apical	14 (6.7)	7 (4.3)	0.33
Subjective reporting FPMRS − apical	25 (11.9)	14 (8.6)	0.30
Case list verified FPMRS + apical	4 (1.9)	3 (1.9)	0.97
Case list verified FPMRS − apical	8 (3.8)	5 (3.1)	0.71

Data are *n* (% yes)

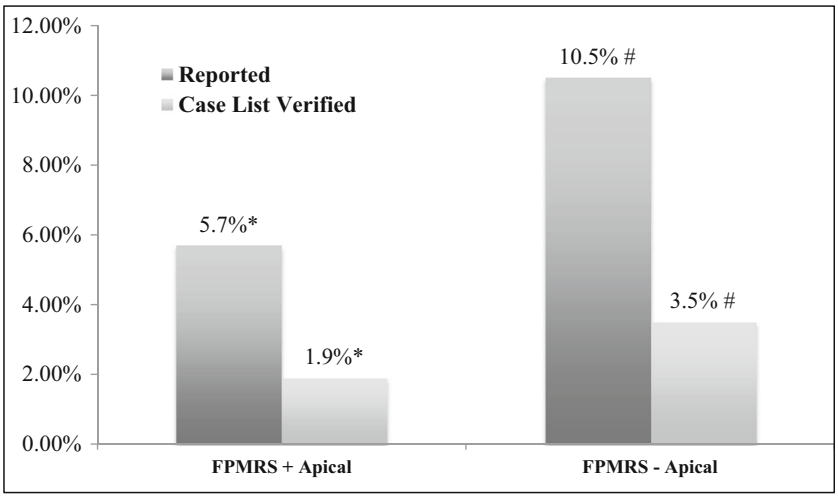

Fig. 1 FPMRS ± apical support subjectively reported vs case list verified for overall cohort ($n = 372$). *$p < 0.001$ overall data for subjectively reported vs case list-verified FPMRS + apical support. #$p < 0.001$ overall data for subjectively reported vs case list-verified FPMRS − apical support

3.16 ± 3.34 posterior repairs per year compared to 3.5 ± 2.96 for those in non-PP $p = 0.38$); PP had 1.94 ± 2.64 posterior repairs on their cases lists compared to 2.14 ± 2.38 for those in non-PP settings ($p = 0.25$).

As in Table 5, significantly more providers in non-PP performed cystoscopy than in PP; there were also more cystoscopies reported on case lists of nonprivate practice providers compared with PPs. Finally, PPs reported significantly fewer GYN cases on their OB/GYN case lists than those in non-PP settings. There were also no statistically significant differences between the two groups in the number of hysterectomies (all modalities) performed per year and no differences between groups in the number of hysterectomies (all modalities) reported on case lists.

Discussion

As the population ages, there will be an increased demand for care for patients with pelvic floor disorders [2]. Technological advancements and residency hour restrictions in US OB/GYN training programs have resulted in decreased surgical versatility and a diminished mastery of the complex pelvic anatomy [6, 7]. As of 2011, the ACGME accredited FPMRS as a subspecialty, and there are currently over 45 fellowship programs in the USA [8]. These factors are likely to have an impact on the ability of OB/GYN providers to offer comprehensive care for patients with pelvic floor disorders.

This is the first study to examine OB/GYN oral board candidates in private practice and other practice settings to gain an understanding of postgraduate urogynecological practice patterns, surgical volumes, and residency experiences. Regardless of whether or not apical surgery is performed, comprehensive FPMRS surgical volumes are low in all practice settings. Consequently, it is not surprising that few providers are able to offer comprehensive FPMRS surgical care. These data are supported by Yun and Siddighi, who showed that generalists who graduated within the previous 10 years were more likely to report that they perform significantly fewer FPMRS surgeries compared with those who graduated over 10 years ago [8]. Additionally, the University of Southern California, LA, noted a statistically significant decrease in vaginal hysterectomy training during residency after the implementation of an FPMRS fellowship [9]. Given changes in residency training, the introduction of new technology, decreasing surgical volumes, and the implementation of the FPMRS fellowship, these data provide a glimpse into decreasing urogynecological surgical volumes and changes in present-day practice patterns. Furthermore, it is well documented that higher surgical volumes are associated with fewer surgical complications and improved preoperative patient assessments [10, 11], further demonstrated by a systematic review of gynecological surgical outcomes that indicated practitioners performing surgery less than once a month are more likely to experience complications [11]. Nevertheless, there is not currently a definitive resolution as to whether surgical volume requirements should be

Table 3 Practice patterns

Category	Private practice ($N = 210$)	Nonprivate practice ($N = 162$)	p
Office cystoscopy	6 (2.9)	6 (3.8)	0.62
Urodynamics	25 (12)	11 (6.9)	0.10
Comfortable teaching slings	23 (11.2)	24 (15.6)	0.22
Refer pelvic organ prolapse	112 (53.6)	103 (66.5)	0.01
Refer incontinence	145 (69.4)	114 (73.1)	0.44
Currently teach residents	86 (41.1)	101 (63.9)	<0.001

Data are n (%yes), mean ± standard deviation (sample size) unless otherwise mentioned

Table 4 FPMRS residency exposure

Category	Private practice ($N = 210$)	Nonprivate practice ($N = 162$)	p
FPMRS training in residency	146 (75.3)	127 (83)	0.08
Number of months of FPMRS in residency	2.14 ± 1.97	2.65 ± 2.40	0.09
Adequate FPMRS training in residency	56 (29.2)	60 (39.7)	0.04
Satisfied with FPMRS training in residency	5.52 ± 2.59	5.93 ± 2.95	0.12

Data are n (% yes), mean ± standard deviation (sample size) unless otherwise mentioned

established to determine whether practitioners with low surgical volumes should perform subspecialty surgery.

The significant differences in case list reporting of FPMRS ± apical surgical volumes compared with subjective reporting may be attributed to candidates' inaccurate recollections of annual surgical volume and/or case list under-reporting. Another interesting observation from this survey was that PP were less likely than those in non-PP settings to report adequate FPMRS training in residency; meanwhile, PPs were also less likely to refer POP to other providers and were more likely to perform POP surgery. The data in this study suggest that PPs might be less likely to refer potential surgical cases than those in other practice settings. It could be inferred that this might be due to the inherent pressures (particularly with newly graduated OB/GYN practitioners working to increase operative experience) and incentive alignment of such practice models or the possibility that PPs perform more FPMRS surgery because they provide care in suburban areas.

Table 5 FPMRS and gynecological surgical volume and experience

Category	Private practice ($N = 210$)	Nonprivate practice ($N = 162$)	p
Perform slings	40 (19)	31 (19.5)	0.91
Perform TVH	173 (82.4)	140 (87.5)	0.17
Perform prophylactic apical support procedures	138 (67.3)	112 (70.9)	0.47
Perform prolapse surgery	81 (38.9)	44 (27.8)	0.014
Prolapse surgery/year	5.02 ± 6.57	4.55 ± 4.26	0.62
Prolapse surgery on case lists	3.39 ± 4.33	3.70 ± 4.37	0.66
Perform cystoscopy	184 (89.3)	152 (95)	0.04
Cystoscopy on case lists	5.81 ± 8.52	8.69 ± 10.78	<0.001
Cystoscopy after all or select hysterectomy			
All	53 (29.8)	57 (38.3)	0.11
Select	125 (70.2)	92 (61.7)	
Total number of hysterectomies/year	17.63 ± 15.5	17.64 ± 12.62	0.16
Total number of hysterectomies on case list	12.06 ± 12.13	12.43 ± 10.9	0.12
Total number of GYN cases on case list	48.84 ± 26.25	57.68 ± 25.44	<0.001

Data are n (% yes), mean ± standard deviation (sample size) unless otherwise mentioned

To the best of our knowledge, this is the first study to assess urogynecological training discrepancies among OB/GYN oral board candidates in different practice settings. Strengths of this study include the high survey response rate and the representation of a large national sample comprising providers from various practice settings across the USU. This study also provides a general representation of self-reported surgical volumes on case lists, which may reflect current surgical trends among OB/GYN oral board examinees. These data could be used to further the ongoing discussion regarding surgical volumes during training and surgical volumes that may be necessary to obtain and maintain surgical competency.

The limitations of this study are inherent to survey studies. Although this survey was distributed for evaluation within our department before use, it is not formally validated, and questions may be misunderstood. The survey does not provide information about other aspects of FPMRS practice such as fecal incontinence, use of mesh, and other pathological conditions within urogynecology that may be of significance, limiting its generalizability to only the procedures studied. There is no analysis of complications relating to surgeon volume, and there are no residency surgical volumes to analyze. This survey is also subject to selection bias, as the population that attends commercial oral board prep courses may not be representative of the generalist OB/GYN provider population. Finally, the participants in this study (recently graduating OB/GYN oral board candidates) limit the generalizability of this study to the general OB/GYN population.

In conclusion, regardless of practice setting, few general OB/GYN board examinees provide comprehensive FPMRS surgical care ± apical support. Urogynecological surgical volumes are also low among general OB/GYN oral board examinees. Despite consistently low surgical volumes, there is a discrepancy between subjective and case list reporting. Practice environments of OB/GYN oral board candidates may affect management patterns of patients with pelvic floor disorders.

Compliance with ethical standards

Conflicts of interest None.

Appendix 1. Survey.

Female Pelvic Medicine and Reconstructive Surgery Practice Survey

Thank you for participating in this survey! The investigators are interested in your practice patterns of FPMRS/ urogynecological procedures. Please answer the following questions to the best of your ability. All the responses are anonymous.

1. Your age: _____

2. Sex: M/F/Other

3. Race: _____

4. Year of graduation from residency: _____

5. Residency region (circle one):
a. Midwest b. Southeast c. Southwest d. West e. Northwest f. Northeast g. Other:_____

6. What type of residency program did you attend (circle one)?
a. Community Hospital b. Community-University Affiliated
c. Academic Institution d. Other _____

7. Current practice region (circle one):
a. Midwest b. Southeast c. Southwest d. West e. Northwest f. Northeast g. Other:_____

8. Type of location (circle one):
a. Rural b. Suburban c. Urban d. Other _____

9. Current type of practice (circle one):
a. In fellowship b. Private practice c. Academic/university based
d. Managed care/Community hospital e. Other_____

9a. Do you currently teach residents/fellows (circle one)? Yes/No.

10. <u>If in fellowship/fellowship trained</u>, which one:
a. FPMRS b. GYN ONC c. MFM d. REI e. MIGS f. Other _____

11. What kind of patients do you see (circle one):
a. OB only b. GYN only c. OB and GYN d. Other _____

12. Do you perform GYN surgery (circle one)? Yes/No.

13. Do you perform in office cystoscopy (circle one)? Yes/No.

14. Do you perform office urodynamics testing (circle one)? Yes/No.

15. Do you perform synthetic mesh slings (circle one)? Yes/No.

If yes, how many total slings do you perform per year? _____
How many retropubic? _____ How many transobturator? _____
How many mini-slings? _____ How many TOTAL slings are on your case list? _____

16. Do you feel comfortable teaching slings to residents (circle one)? Yes/No.

17. If you have patients with urinary incontinence, do you refer them out (circle one)? Yes/No.

18. If you have patients with pelvic organ prolapse, do you refer them out (circle one)? Yes/No.

19. Do you perform vaginal hysterectomies (circle one)? Yes/No.

If yes, how many do you perform per year? _____
How many are on your case list? _____

20. Do you perform prophylactic apical support procedures at the time of hysterectomy (circle one)? Yes/No.

If yes, which one(s) do you perform (please write in)?
_____

21. Do you perform pelvic organ prolapse surgery (circle one)? Yes/No.

If yes, do you perform mesh kits for prolapse (circle one)? Yes/No.
How many mesh kits for prolapse do you perform per year? _____
How many are on your case list? _____

If yes, do you perform (circle all that apply):
a. APICAL repairs
b. ANTERIOR repairs
c. POSTERIOR repairs

If you perform APICAL repairs, which route do you use (circle all that apply):
a. VAGINAL
b. LAPAROSCOPIC
c. ROBOTIC
d. ABDOMINAL

How many APICAL prolapse repairs do you perform per year?_____
How many APICAL prolapse repairs are on your case list? _____

How many ANTERIOR REPAIRS do you perform per year?_____
How many ANTERIOR REPAIRS are on your case list? _____

How many POSTERIOR REPAIRS do you perform per year?_____
How many POSTERIOR REPAIRS are on your case list? _____

How many TOTAL prolapse surgeries do you perform per year?_____
How many TOTAL prolapse surgeries are on your case list? _____

22. Are you credentialed to perform cystoscopy (circle one)? Yes/No.

23. Do you perform cystoscopy (circle one)? Yes/No.
If yes, do you perform cystoscopy after (circle all that apply):
-TVH
-TAH
-TLH
-LAVH
-Robotic Assisted Hysterectomy
-Complicated TVH
-Complicated TAH
-Complicated TLH
-Complicated LAVH
-Complicated Robotic Assisted Hysterectomy
-I perform cystoscopy after ALL hysterectomies.

24. How many cystoscopies are on your case list? _____

25. How many TOTAL GYN cases are on your case list? _____

26. Did you have a FPMRS/UroGyn rotation during residency (circle one)? Yes/No.

-If yes, how many MONTHS of your residency was dedicated to FPMRS (please write in)? _____

27. Were you trained to perform cystoscopy in residency? (circle one)? Yes/No.

28. Do you feel that OB/GYN residents receive adequate FPMRS/UroGyn training for their future practice needs (circle one)? Yes/No.

29. How satisfied were you with your FPMRS/UroGyn training during residency? (0: not satisfied, 10 very satisfied. Circle one):

0 1 2 3 4 5 6 7 8 9 10

References

1. Brueseke T, Muffly T, Rayburn W, et al. Workforce analysis of female pelvic medicine and reconstructive surgery, 2015 to 2045. Female Pelvic Med Reconstr Surg. 2016;22(5):385–9.
2. Wu JM, Kawasaki A, Hundley AF, et al. Predicting the number of women who will undergo incontinence and prolapse surgery, 2010 to 2050. Am J Obstet Gynecol. 2011;205(3):230–5.
3. Ciotti M. Minimum thresholds for obstetric and gynecology procedures. Available at: https://www.acgme.org/acgmeweb/Portals/0/PFAssets/ProgramRe sources/220_Ob_Gyn%20Minimum_Numbers_Announcment.pdf); 2012. Accessed 6 October 2017.
4. Jelovsek JE, Walters MD, Koran A, et al. Establishing cutoff scores on assessment of surgical skills to determine surgical competence. Am J Obstet Gynecol. 2010;203(1):81.e1–6
5. Rogo-Gupta LJ, Lewin SN, Kim JH. The effect of surgeon volume on outcomes and resource use for vaginal hysterectomy. Obstet Gynecol. 2010;116(6):1341–7.
6. Espey E, Ogburn T, Puscheck E. Impact of duty hour limitations on resident and student education in obstetrics and gynecology. J Reprod Med. 2007;52(5):345–8.
7. Burkett D, Horwitz J, Kennedy V, et al. Assessing current trends in resident hysterectomy training. Female Pelvic Med Reconstr Surg. 2011;17(5):210–4.
8. Yun JJ, Siddighi S. Perceptions and practice patterns of general gynecologists regarding urogynecology and pelvic reconstructive surgery. Female Pelvic Med Reconstr Surg. 2013;19(4):225–9.
9. Chaudhry Z, Tarnay CM. Assessing resident surgical volume before and after initiation of a female pelvic medicine and reconstructive surgery fellowship. J Surg Educ. 2017;74(3):450–4.
10. Pulliam SJ, Morgan DM, Guaderrama N, et al. Differences in patterns of preoperative assessment between high, intermediate, and low volume surgeons when performing hysterectomy for uterovaginal prolapse. Female Pelvic Med Reconstr Surg. 2016;22(1):7–10.
11. Mowat A, Maher C, Ballard E. Surgical outcomes for low-volume vs high-volume surgeons in gynecology surgery: a systematic review and meta-analysis. Am J Obstet Gynecol. 2016;215(1):21–33.