



## Physician attitudes and knowledge on prophylactic salpingectomy in perimenopausal patients

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### ABSTRACT

**Purpose:** Eighty percent of the approximately 500,000 hysterectomies performed annually in the US are for benign indications. There is lack of consensus regarding concurrent removal of fallopian tubes and/or ovaries. Ovarian cancer risk reduction is the principal benefit but the adverse consequences of ovarian removal can include vasomotor disturbance, vaginal dryness, cardiovascular disease, osteoporosis, and cognitive decline. Emerging evidence on the role of fallopian tubes in ovarian carcinogenesis and the consequences of oophorectomy have led the American College of Obstetricians-Gynecologists (ACOG) to recommend bilateral salpingectomy with ovarian conservation during benign hysterectomy for women at population risk for ovarian cancer.

**Methods:** Five hundred members of the ACOG Collaborative Ambulatory Research Network (CARN) were randomly selected to participate in this survey study.

**Results:** 165 completed the survey (35.3% response rate). Most respondents reported that a family history of breast, ovarian or colon cancer and patient age influence their decision to offer salpingectomy more than 75% of the time. Factors that a majority of respondents reported discussing during counseling included possible ovarian cancer risk reduction, surgical menopause, severity of symptoms, and the effects on bone and cardiovascular health. The respondents mean score for the knowledge-based questions was only 1.7 ( $\pm 0.92$ ) out of 4 points.

**Conclusion:** Several factors may affect decision making for prophylactic salpingectomy at the time of hysterectomy however paramount among these is cancer risk reduction. Most physicians found it difficult to discuss and implement a change in care for patients with preconceived notions of ovarian preservation or removal.

### 1. Introduction

400–500,000 hysterectomies are performed annually in the US with over 80% for benign indications (Wright, 2013). Given the paradigm shift in our understanding of the pathophysiology of ovarian cancer many believe a hysterectomy for benign indications is an opportunity for significant risk reduction. Few argue against the value of prophylactic bilateral salpingo-oophorectomy (BSO) in the setting of genetic risk of ovarian cancer, however in low risk patients it is not recommended due to increase in mortality (Parker, 2009).

As the role of fallopian tubes in ovarian carcinogenesis becomes clearer the relatively low risk step of performing a risk reducing bilateral salpingectomy (BS) is increasingly encouraged. At this point 11 national

societies including the American College of Obstetricians and Gynecologists (ACOG) have published opinions to consider prophylactic BS for women at average risk for ovarian cancer (no genetic predisposition) (ACOG, 2019). This is despite the fact that limited data directly demonstrating reduction of ovarian cancer rates in subjects receiving prophylactic BS has been published (Falconer, 2015).

Several large studies have shown that prophylactic BS does not significantly increase surgical time, operative risk or hospital days; however, they have also identified varied counseling and practice patterns (van Lieshout et al., 2019). There is a need to examine patient and physician knowledge, attitudes and beliefs regarding prophylactic adnexal surgery because tools, with explicit input from patients and providers, for individualized risk assessment and shared decision-

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making are lacking. The specific aim of this project was to survey a large, established network of clinically active OB/GYNs to identify factors that influence their decision to offer prophylactic BS and whether or not characteristics of those providers or their practice modify that likelihood. Our secondary goal was to further investigate the respondents knowledge around the risks and benefits of prophylactic BS (Jones, 2017).

## 2. Methods

### 2.1. Sample and study design

Five hundred members of the American College of Obstetricians and Gynecologists (ACOG) and the Collaborative Ambulatory Research Network (CARN) were selected to participate in this study. The CARN is a group of practicing OB/GYNs demographically representative of ACOG members as a whole who voluntarily participate in research surveys (Taouk et al., 2018; Raglan, 2020; Arora et al., 2018; Holden, 2018). The 500 study subjects were randomly selected from a list of almost 1500 current CARN members using proportionate stratified sampling. This study was approved by the Yale Institutional Review Board.

A unique survey link was emailed to all participants, along with a cover letter, through Qualtrics software, Qualtrics®, Provo, UT. The survey was an online questionnaire consisting of 9 demographic questions and 18 questions about oophorectomy in perimenopausal women, including four multiple-choice general knowledge questions (Appendix A). The knowledge questions were developed by the authorship team and beta-tested with a small group of practicing Gynecologists. An opt-out link was provided for recipients who were retired or did not wish to participate. After the initial invitation, non-respondents received weekly reminder emails until they responded or a maximum of 5 reminders were sent. Data collection took place between November 2016 and January 2017.

### 2.2. Data analysis

Statistical analysis was performed using IBM SPSS Statistics 24.0, IBM Corp®, Armonk, NY. Respondents who completed less than 10% of the survey were excluded in the analysis. States were categorized into U. S. regions based on U.S. Census Bureau definitions (Northeast, Midwest, South, and West). Correct answers to the knowledge questions were grouped together to create a continuous variable, salpingectomy/oophorectomy or salpingectomy knowledge score. Chi-squared tests were performed for comparative analysis of categorical variables; tests that had  $\geq 25\%$  of cells with an expected count of less than 5 were considered invalid and not reported. Independent t-tests and ANOVAs were used to compare group means of continuous variables. Results were considered statistically significant at  $p < .05$ .

## 3. Results

### 3.1. Response rate and demographics

Of the 500 CARN members invited to participate, 32 opted-out of participating leaving a final sample of 468 participants. One hundred sixty-five completed the survey yielding a response rate of 35.3%, typical for CARN network surveys. There were 18 members with either incomplete responses or who did not perform hysterectomies in 2016 (exclusion criteria) therefore the data analyses reflect the responses of 147 participants.

The majority of respondents were female (58.1%) and the average age was 49.95 ( $\pm 11$  years). Female respondents were younger than male respondents (female, mean age = 45.2  $\pm$  9.9 years; males, mean age = 56.7  $\pm$  8.1 years,  $p < .001$ ). Additional demographics for the survey respondents are shown in Table 1.

**Table 1**  
Demographics.

Characteristic	n (%) or mean $\pm$ standard deviation
Age	49.95 $\pm$ 10.8
Years in Practice	19.2 $\pm$ 10.6
10 years or less	25 (24.8)
10 + years	76 (75.2)
Gender	
Female	61 (58.1)
Male	44 (41.9)
Race	
White, non-hispanic	87 (82.9)
Asian or Pacific Islander, non-hispanic	7 (6.7)
Hispanic/Latino	6 (5.7)
Black or African American, non-hispanic	2 (1.9)
Other, non-hispanic (includes Multiracial and AI/AN)	3 (2.9)
Practice Region	
Midwest	28 (26.7)
South	29 (27.6)
West	26 (24.8)
Northeast	22 (21.0)
Residency Region	
South	32 (30.8)
Northeast	27 (26.0)
Midwest	30 (28.8)
West	15 (14.4)
Primary Medical Specialty	
General Obstetrics and Gynecology	87 (84.5)
Gynecology	10 (9.7)
Other (includes MFMs, Urogynecology, etc)	5 (4.9)
Obstetrics	1 (1.0)
Practice Setting	
Ob-gyn Partnership/Group	42 (40.0)
Multi-specialty Group	23 (21.9)
University Faculty Practice	16 (15.2)
Hospital, Clinic, or HMO/Staff Model	16 (15.2)
Solo Private Practice	8 (7.6)
Practice Location	
Suburban	28 (26.7)
Urban, non-inner city	31 (29.5)
Mid-sized town (10,000–50,000)	21 (20.0)
Urban, inner city	15 (14.3)
Rural	9 (8.6)
Military	1 (1.0)

### 3.2. Benign hysterectomy practices

The majority of respondents (69%) reported they performed 25 or fewer hysterectomies in 2016; a quarter (24.8%) performed between 25 and 50 and 5.3% performed 50 or more. The majority of respondents (90.2%) stated that over 75% of these hysterectomies were for benign indications. At the time of benign hysterectomy, 76.9% of respondents reported performing BS with ovarian conservation more than 75% of the time, compared to 62% of respondents who reported performing BS with ovarian conservation more than 75% of the time in perimenopausal women (aged 45 to 65). Only 2.0% of respondents reported never performing BS with ovarian conservation and 5.4% reported never performing BS with ovarian conservation in perimenopausal women. When asked how frequently they performed BSO in perimenopausal women, most (59.8%) reported performing one less than 25% of the time and 8.9% reported never performing one.

The rate at which certain factors and years in practice influence the decision of respondents to perform BS with ovarian conservation in perimenopausal women at the time of benign hysterectomy is shown in Table 2.

The rate at which certain factors are reportedly discussed by respondents when counseling perimenopausal women undergoing benign hysterectomy for BS with ovarian conservation is shown in Table 3.

When asked about challenges faced when considering BS with ovarian conservation at the time of benign hysterectomy for

**Table 2**

Frequency of the following influencing decision to perform bilateral salpingectomy with ovarian conservation in perimenopausal women aged 45–65 at the time of benign hysterectomy.

Factors	Frequencies		Years in Practice			
	0% of the time	≥75% of the time	0% of the time		≥75% of the time	
			10 years or less	10 + years	10 years or less	10 + years
Patient's age: 45–50 years	16 (10.9)	69 (46.9)	6 (33.3)	8 (14.0)	12 (66.7)	49 (86.0)
Patient's age: 51–55 years	19 (12.9)	60 (40.8)	6 (37.5)	11 (20.4)	10 (62.5)	43 (79.6)
Patient's age: 56–60 years	23 (15.6)	57 (38.8)	10 (55.6)*	11 (21.2)*	8 (44.4)*	41 (78.8)*
Patient's age: 61–65 years	26 (17.7)	53 (36.1)	10 (52.6)	14 (28.0)	9 (47.4)	36 (72.0)
Menopausal status	21 (14.3)	42 (35.4)	7 (46.7)	11 (22.4)	8 (53.3)	38 (77.6)
Preoperative FSH levels	64 (43.5)	8 (11.1)	18 (10.0)	38 (84.4)	0 (0)	7 (15.6)
Family history of breast, ovarian or colon cancer	9 (6.1)	83 (56.5)	3 (15.8)	5 (7.9)	16 (84.2)	58 (92.1)
Family age of menopause	52 (35.4)	11 (7.5)	13 (92.9)	31 (75.6)	1 (7.1)	10 (24.4)
Current menopausal symptomatology	34 (23.1)	29 (19.7)	9 (75.0)	18 (43.9)	3 (25.0)	23 (56.1)
History of pelvic inflammatory disease (PID) or tubal disease (n = 136)	38 (25.9)	24 (16.3)	13 (92.0)*	20 (47.6)*	1 (7.1)*	22 (52.4)*

\* p < .05

**Table 3**

Frequency of discussing the following factors when counseling perimenopausal women aged 45–65 undergoing bilateral salpingectomy with ovarian conservation at the time of benign hysterectomy.

Factors	0% of the time	≥75% of the time
Possible ovarian cancer risk reduction	0 (0)	106 (72.1)
Surgical menopause	4 (2.7)	95 (64.6)
Severity of symptoms	6 (4.1)	87 (59.2)
Effect on cardiovascular health	8 (5.4)	79 (53.7)
Effect on bone health	7 (4.8)	79 (53.7)
Effect on cognition	17 (11.6)	55 (37.4)
Possible need for tubal surgery in the future	19 (12.9)	53 (36.1)
Possible increased operative time	29 (19.7)	42 (28.6)
Possible increased bleeding	30 (20.4)	35 (23.8)
Possible increased surgical cost	56 (38.1)	14 (9.5)

perimenopausal women, the majority of respondents (87.5%) reported that an unknown date of menopause was never or rarely a challenge; 12.5% reported that it was often or always a challenge. Most respondents (84.6%) reported that unknown effects of surgical menopause were never or rarely a challenge and 15.4% reported that it was often or always a challenge. A third of respondents (34.2%) reported that patient hesitation or concern was often or always a challenge, while only 8% reported that dense adhesive disease was often/always a challenge.

Respondents were asked about their preferred management for a patient planning a hysterectomy in specific scenarios by age. For abnormal uterine bleeding with no family history of breast, ovarian, or colon cancer, 85.5% of respondents reported they would recommend BS with ovarian conservation for a 45 years-old, pre-menopausal patient and 60.6% would recommend risk-reducing BSO for a 60 year-old, post-menopausal patient. If the patient was post-menopausal and 55 years-old, about half of the respondents (49.5%) would recommend BS with ovarian conservation and 43.1% would recommend risk-reducing BSO. Less than 9% reported they would recommend other procedures or refer to a gynecologic oncologist (8.2% for a 45 years-old, pre-menopausal patient, 7.4% for a 55 years-old, post-menopausal patient, and 8.2% for a 60 years-old, post-menopausal patient). For abnormal uterine bleeding with a family history of breast cancer (BReast CAncer gene negative), 60.9% of respondents would recommend bilateral salpingectomy with ovarian conservation for a 45 years-old, pre-menopausal patient, while 69.1% and 78.2% would recommend risk reducing bilateral BSO for a 55 years-old, post-menopausal patient and a 60 years-old, post-menopausal patient, respectively. Less than 10% would recommend other procedures or refer to a gynecologic oncologist (9% for a 45 years-old, pre-menopausal patient, 6.3% for a 55 years-old, post-menopausal patient, and 6.3% for a 60 years-old, post-menopausal patient).

Almost all (98.0%) reported that they encounter patients who have

preconceived notions of ovarian preservation or removal at the time of benign hysterectomy. Most (86.5%) respondents found it difficult to discuss and implement a change in care with patients who have preconceived notions of ovarian preservation or removal. The majority (74.8%) reported they sometimes found it difficult, while only 11.7% reported they usually or always found it difficult.

### 3.3. Oophorectomy knowledge

For almost all the knowledge-based questions the correct response was the most likely to be chosen for an individual question, however, the mean score of correct answers for individual respondents was only 1.7 (±0.92) out of 4 total points. 45.9% of respondents correctly answered that in menopause, estradiol decreases by 80% and testosterone decrease by 50%. 43.2% correctly answered that one thousand cases of ovarian cancer could be prevented if bilateral salpingo-oophorectomy was performed in women undergoing hysterectomy at 40 years or older in the United States. 38.7% correctly answered that the frequency of repeat surgery for ovarian pathology following bilateral ovarian preservation at the time of hysterectomy is 3.6%. Only when asked which conditions have not been associated with increased risk of reoperation in cases of ovarian preservation did the plurality chose the incorrect response; 48.6% answered pelvic inflammatory disease, while 43.6% correctly indicated history of ovarian cystectomy. There were no statistically significant relationships between the score and demographic characteristics.

## 4. Conclusion

In our population of clinically active OB/GYNs we noted a self-reported rate of opportunistic salpingectomy of 77% which is similar to previously reported data (ACOG, 2019). The recommendation for opportunistic salpingectomy is principally influenced by the risk of related familiar cancers (Steenbeek, 2019). Patient age and past pelvic health history may also be significant influences on the recommendation for BS in advance of surgery, however more experienced providers appear more likely to incorporate that information. Nearly all respondents noted that patients present with preconceived notions about prophylactic adnexal surgery and as a result, those discussions can be challenging from the provider perspective. In addition, we identified a potential knowledge gap in this group of OB/GYNs.

As the evidence supporting the benefit of opportunistic salpingectomy solidifies, effort will be needed to overcome provider's preconceived notions about the benefits of salpingectomy for the patient and the ease of performing the procedure for the provider (van Lieshout et al., 2019; Catanzarite and Eskander, 2020). Reade et al. surveyed OB/GYNs in Canada in 2012 with the goal of establishing their awareness and understanding of opportunistic salpingectomy. Over 90% of the

respondents, roughly 50% subspecialists and 50% generalists, were aware of risk-reducing salpingectomy. The authors surmised this awareness most likely came from the media coverage of a 2010 cancer research campaign because only 25% of respondents reported reviewing peer reviewed publications (Reade, 2013). In 2014, Kapurubandara et al surveyed all active Royal Australian and New Zealand College of Obstetrics and Gynecology fellows. Seventy percent of the respondents offered OS to their patients principally due to the evidence suggesting the fallopian tubes as the origin for most epithelial ovarian cancers. The primary reasons cited not to offer OS however were due to insufficient evidence to benefit the patient or the provider being unaware of the evidence supporting OS (Kapurubandara, 2015).

Patient reluctance to undergo salpingectomy appears limited. Tomasch et al performed a pilot interview study of 20 low risk Austrian women  $\geq$  45 years old who were consented for laparoscopic cholecystectomy to determine their interest and concerns about concomitant salpingectomy, although the procedure itself was not offered. Of the 20 women, 17 would accept and an additional 2 would “probably” accept a salpingectomy at the time of their elective cholecystectomy (Tomasch, 2018).

Several studies have also addressed provider misperception about of the feasibility salpingectomy, particularly at the time of vaginal hysterectomy. Potz et al. surveyed gynecologists in Austria where 70% were offering OS with benign gynecologic surgery and identified salpingectomy as the preferred method of surgical sterilization, including at the time of cesarean section (Potz, 2016). Venturella et al reported that 82% of Italian gynecologists perform OS at the time of hysterectomy. Of the providers that do not perform OS, over 50% reported they did not believe that salpingectomy was associated with benefit and 22% believed it increased the risk of intraoperative complications (Venturella, 2016). In a similar survey study to ours Dutch providers were less likely to recommend salpingectomy when vaginal hysterectomy intended despite the fact that BS is typically feasible in  $\sim$  75–85% of patients although the respondents estimated the feasibility closer to 50% (Steenbeek, 2019).

This study has several important limitations. First the response rate was modest which increases the risk of meaningful bias in our results if the respondents are not reflective of typical OB/GYNs in the United States. Second our results are self-reported and therefore may not reflect actual practice. Third our questionnaire, in particular the knowledge based questions, was novel and the meaning of the questions may have been misconstrued by the respondents. With that acknowledged, however, our results were overall consistent with similar work in this field.

While consensus statements can be impactful as evidenced by the significant increase in BS in the US and Canada the results of this and other studies suggest meaningful misinformation persists (Tjalma, 2019; Hanley, 2017; McAlpine et al., 2014; Ntomanoglou-Schuijki, 2018). For low risk patients there are few resources to aid in shared decision making around benign hysterectomy or other pelvic surgeries, although patients do not appear reluctant to undergo prophylactic BS (Ghezelayagh, 2020; Manoukian, 2019). Given the uncertainty around all the indications for prophylactic adnexal surgery but the potential for health benefits, our goal is to continue to investigate what influences providers recommendations to eventually contribute to a shared decision making tool for prophylactic adnexal surgery beyond simply a family history of ovarian cancer.

#### Declarations

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**Conflicts of interest/Competing interests:** None

#### Ethics approval

This study was approved by the Yale Institutional Review Board

#### Consent to participate

All subjects consented to participate

#### Consent for publication

All authors consent to publication

**Availability of data and material** Data and material available upon request

**Code availability:** Qualtrics software, Qualtrics®, Provo, UT ; IBM SPSS Statistics 24.0, IBM Corp®, Armonk, NY

#### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Appendix A

##### MD Survey General Knowledge Questions:

- In menopause, estradiol and testosterone decrease by how much respectively:
  - 50% estradiol and 80% testosterone
  - 80% estradiol and 50% testosterone**
  - 30% estradiol and 95% testosterone
  - 95% estradiol and 30% testosterone
  - 60% estradiol and 60% testosterone
- How many cases of ovarian cancer could be prevented if bilateral salpingoopherectomy was performed in women undergoing hysterectomy at 40years or older in the United States?
  - 10
  - 100
  - 1000**
  - 10,000
- The frequency of repeat surgery for ovarian pathology following bilateral ovarian preservation at the time of hysterectomy is:
  - 1.2%
  - 3.6%**
  - 7.6%
  - 10.3%
- Which of the following conditions has **NOT** been associated with increased risk of reoperation in cases of ovarian preservation?
  - Endometriosis
  - Pelvic inflammatory disease
  - Chronic pelvic pain
  - History of ovarian cystectomy**

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