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Assessing physician adherence to guidelines for cervical cancer screening and management of abnormal screening results

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Abstract

Objectives—To survey obstetrician-gynecologists' cervical cancer screening practices and management of cervical abnormalities to ascertain adherence to guidelines.

Methods—From January-July 2019, obstetrician-gynecologists at five St. Louis area hospitals were surveyed online about cervical cancer screening and management practices through 13 clinical vignettes. Survey scores and ASCCP app use were compared using Mann-Whitney tests.

Results—When screening 30–65-year-olds, 114 of the 116 total (98%) participants used cotesting, but only 71 (61%) screened at five-year intervals. None used primary HPV testing. For 21–29-year-olds, 17 (15%) screened with annual cytology while 14 (12%) used annual or every three-year cotesting. 48 (41%) screened <21-years-olds regardless of risk factors or only if immunocompromised. 11 (9%) continued screening after total hysterectomy for benign indications. Only 2 (2%) responded to all clinical vignettes in adherence to guidelines. Over 30% of participants would pursue unnecessary HPV testing and/or LEEP for persistent low-grade cytology. 58 (48%) incorrectly reported hysterectomy as management for adenocarcinoma in situ on biopsy. Participants would undertreat young women with high-grade abnormalities including HSIL/CIN3 (48, 41%) and HSIL/CIN1 (65, 56%). 41 (35%) reported exiting women from screening prematurely. Median score for participants using the ASCCP app was significantly greater than those who did not (79% v 71%, $p=0.002$).

Conclusion—Midwestern obstetrician-gynecologists' adherence to the guidelines for cervical cancer screening and management of abnormal results is suboptimal. While cotesting for women aged 30–65 years has been broadly adopted, primary HPV testing has not. Physicians overscreen, overtreat low-grade lesions, and undertreat high-grade lesions in young women.

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Keywords

cervical cancer; cancer screening; overtreatment; nonadherence to guidelines

Introduction

Over the last decade, three new guidelines have been published by the ASCCP regarding cervical cancer screening and management of abnormal results and cancer precursors.^{1–3} These guidelines have only grown in complexity and consist of nearly 20 different algorithms alone for management of abnormal screening tests.² Some highlighted practice updates that have emerged from these published guidelines include new criteria for initiation of screening at age 21 regardless of coitarche; screening options such as human papillomavirus (HPV) and cytology cotesting for women aged 30 years or older as well as primary HPV screening starting at age 25.^{1,3} Criteria to exit women from screening also have updated definitions of “adequate screening” based on cotesting.¹ Likewise, management guidelines have also adopted cotesting as a follow-up strategy for low-risk women (e.g. women 30 years and older with low-grade squamous intraepithelial lesion (LSIL) and negative HPV test, women with atypical squamous cells of undetermined significance (ASC-US) cytology and negative HPV test, and women 30 years and older with negative cytology and HPV positive, though HPV 16 and 18 negative), defined tailored management for those aged 21–24 years, and provided recommendations regarding cytology with specimen adequacy limitations.² Though estimates of sensitivity and specificity of any screening strategy are dependent on the prevalence of disease and follow-up of abnormal results, high-risk HPV testing and cotesting have improved negative predictive value compared with cytology alone. It remains unclear whether physicians have accepted this reassuring margin of safety and are practicing in accordance to guidelines. To overcome the complexity of these new guidelines, the ASCCP developed a mobile application for providers to access the updated cervical cancer screening and management algorithms.⁴ With the new ASCCP Risk-Based Management Consensus Guidelines recently released in March 2020, a look back at how United States physicians have accepted the last round of guidelines is timely.⁵

This study aimed to survey Midwestern obstetrician-gynecologists’ practice patterns to ascertain adherence to and deviation from guidelines for cervical cancer screening and management of abnormal results. The primary objective was to assess physician preference of screening modality (e.g. cytology alone, cotesting, or primary HPV testing) and application of recommended screening intervals and initiation and exit criteria. The secondary objective was to identify any patterns of suboptimal adherence to guidelines on screening and management of abnormal and precursor cervical lesions set forth by the ASCCP, American Cancer Society (ACS), United States Preventative Services Task Force (USPSTF), and American College of Obstetricians and Gynecologists (ACOG).

Methods

We performed a cross-sectional survey study of obstetrician-gynecologists affiliated with five Departments of Obstetrics and Gynecology in St. Louis, Missouri. Prior to initiating the study, all procedures were reviewed and approved on February 21, 2019 by Washington University's Human Research Protection Office (Institutional Review Board, IRB Project #201810017). Due to the nature of this study, informed consent and ethics committee approval were waived by the IRB.

Participants and recruitment

Obstetrician-gynecologists affiliated with Departments of Obstetrics and Gynecology at Washington University, St. Louis University, Missouri Baptist Medical Center, St. Luke's Hospital, and Mercy Hospital were recruited. With letters of support from the Department Chairman at each of the participating institutions, we obtained email addresses of obstetrician-gynecologists. Broad inclusion criteria were implemented to ensure the generalizability of our results. Physicians who said they did not perform cervical cancer screening were excluded from the study. To assess this criterion, participants were asked, "Do you ever perform cervical cancer screening services (i.e. Pap +/- HPV testing)?" If the respondent answered, "No" to this question, the survey automatically ended, and their responses were excluded from analysis.

Survey

The survey (See Supplemental Table) was created using REDCap (Research Electronic Data Capture), an established, secure, web-based data capture and management tool developed at Vanderbilt University and supported by the bioinformatics team at Washington University School of Medicine (<http://www.biostat.wustl.edu/redcap/>). The survey was conducted between January and July 2019. Each participant received a secure email, by way of a unique embedded link that connected him or her to the anonymous survey in REDCap.

The participants were presented with multiple-choice questions to assess their cervical cancer prevention practices. Six total questions ascertained their screening practices, specifically asking about preferred screening tests based on age, follow-up interval, utilization of HPV testing, and screening initiation and exit. To our knowledge, there are no validated measures assessing adherence to guidelines for management of abnormal cervical cancer screening tests and cancer precursors. Thus, we designed 13 original clinical vignettes, including four questions based on low-grade screening results, seven questions based on high-grade screening results, and two questions based on screening initiation and exit standards. These were initially designed by the principal investigator, and then face and construct validities were assessed through review of the vignettes by senior authors, LMK and LSM, both of whom are gynecologic oncologists and have specialized interests in HPV and cervical cancer screening. Correct responses were selected in accordance with the guidelines set forth by the ASCCP, ACS, UPSTF, and ACOG. Some of the survey questions allowed for multiple correct responses according to guidelines and were scored accordingly.

Also, the survey evaluated physician demographics and practice characteristics. Demographics included age, gender, years in practice, and Obstetrics and Gynecology Board Certification. Practice characteristics included location (urban, suburban, rural), obstetrics and gynecology subspecialty, description of primary practice (academic, private), time spent in clinical practice (part time – less than 50%, full time – greater than or equal to 50%), if Medicaid patients are accepted, and cervical cytology test volume (number of tests performed per month).

Statistical analysis

Demographics, practice characteristics, and screening patterns of the surveyed obstetrician-gynecologists were summarized using counts and frequencies. Chi-square test or Fisher's exact test were used to assess associations between physician characteristics and correctly addressing <50% of the six screening questions. Although there is no standard benchmark to define adherence to management guidelines for cervical abnormalities, for study purposes, suboptimal adherence was considered correctly addressing <80% of the 13 clinical vignettes. All statistical analyses were performed using SAS Version 9.4 (SAS Institute Inc. 2013. Cary, NC, USA). All analyses were two-sided and an alpha level of 0.05 was used for all statistical tests.

Results

Physician characteristics

The online survey was sent to 313 physicians affiliated with at least one of the five area medical centers and was conducted between January and July 2019. Of the 313 physicians, three were not specialized in obstetrics and gynecology, and were thus excluded. Of the 127 physicians who responded to the survey, 116 stated that they performed cervical cancer screening services and were included in our analyses. Their demographic and practice characteristics are shown in Table 1. Most of the participants were young, female, in early to mid-career, board certified in Obstetrics and Gynecology, general obstetrician-gynecologists, practicing in urban or suburban locations and in non-academic practices, and full time in clinical practice. Nearly half of participants did less than or equal to 20 cervical cytology tests each month (54, 46.6%).

Cervical cancer screening practices

Physicians' cervical cancer screening practices are described in Table 2. None of the obstetrician-gynecologists reported using primary HPV testing, yet 92 (79.3%) correctly knew when to initiate this test. While 114 (98.3%) reported using cotesting when screening women aged 30–65 years, only 71 (61.2%) reported using five-year intervals and 11 (9.5%) screened at less than three-year intervals. For screening young women, 17 (14.7%) physicians reported screening with annual cervical cytology testing while 14 (12%) reported annual or every three-year cotesting. 48 (41.4%) physicians reported initiating screening prematurely before 21 years of age. For screening exit, physicians reported heterogeneous practices; 11 (9.4%) reported continued screening after a total hysterectomy for benign indications, while 41 (35.3%) reported exiting women from screening prematurely.

Correlates of scoring <50% on screening-related questions

Correlates of scoring <50% on screening-related questions are listed in Table 3. Correctly addressing <50% of screening-related questions was significantly more likely among physicians who were older than 40 years (37, 86%, $p<0.001$), female (26, 60.5%, $p=0.003$), practicing for more than 20 years (22, 51.2%, $p<0.001$), working in a suburban area (34, 79.1%, $p<0.001$) and in private practice (31, 72.1%, $p=0.001$), and performing greater than 20 cervical cytology tests each month (31, 72.1%, $p=0.003$).

Adherence to guidelines for managing abnormal screening results

Only two obstetrician-gynecologists responded to all clinical vignettes in conformance to guidelines, whereas 95 displayed suboptimal adherence. Correct response rates for each vignette ranged from 41.4–98.3%. Figure 1 shows the percentage of participants that responded with suboptimal adherence to guidelines for managing abnormal screening results for each clinical vignette category—low-grade results, high-grade results, and screening initiation/exit. While most physicians responded with suboptimal adherence to guidelines for each category, clinical vignettes regarding low-grade screening results and screening initiation/exit were answered incorrectly more often than vignettes about high-grade results. Over 30% of physicians would pursue unnecessary HPV testing and/or loop electrosurgical excision procedure (LEEP) for persistent low-grade cervical cytology test results. Fifty-six (48.3%) physicians incorrectly reported hysterectomy as management for adenocarcinoma in situ (AIS) on biopsy. Physicians often recommended observation without immediate treatment for younger women with high-grade abnormalities including high-grade squamous intraepithelial lesion (HSIL) on cytology and cervical intraepithelial neoplasia (CIN) 3 on biopsy (48, 41.4%) and HSIL and CIN 1 (65, 56%). Forty-one (35.3%) physicians reported exiting women from screening prematurely with no prior history of CIN 2+, but episodic screening.

We also explored correlates of suboptimal adherence to management guidelines. None of the obstetrician-gynecologists' characteristics were significantly associated with suboptimal adherence. However, 95 (81.9%) physicians reported using the ASCCP app in their general practice and 37 (31.9%) when responding to the survey clinical vignettes. Median scores for the vignettes among physicians using the app were significantly higher than those who did not (general practice: 71.4% v 64.3%, $p=0.01$; survey: 78.3% v 71.4%, $p=0.002$).

Discussion

In this group of Midwestern obstetrician-gynecologists, suboptimal adherence to guidelines for cervical cancer screening and management of abnormal results is pervasive. While they have adopted cotesting for women aged 30–65 years, primary HPV testing was underutilized, and overscreening remained rampant. With regards to deviations from management guidelines, our survey participants reported overtreatment of persistent low-grade lesions, but had a tendency to undertreat young women with HSIL. From a public health perspective, the implications are far reaching, as approximately 65 million cervical cytology tests are performed each year in the United States, of which 3.9 million (6%) will require medical follow-up.^{6–8} Adherence to evidence-based guidelines is imperative to

optimize cancer prevention strategies while minimizing the potential harms from over diagnosis and treatment, especially of low-grade lesions that are transient.

A striking practice pattern that is highlighted by our survey results is the slow uptake of primary HPV screening among this population of Midwestern obstetrician-gynecologists. This is particularly concerning given that an existing study revealed that physicians around the United States do embrace the use of primary HPV testing at substantially higher rates than our study's findings.⁹ Educational outreach over the past two decades has rendered providers and patients more comfortable with discussing HPV infections, yet uptake of primary HPV screening continues to lag behind cotesting despite multiple randomized control trials showing its effectiveness.^{10,11} In fact, the UPSTF's 2018 screening guideline recommends primary HPV testing over cotesting for women aged 30–65 years, as studies now show that cotesting increases cost with minimal improvement in cancer prevention.^{12,13,14} Furthermore, the value of primary HPV screening will increase as HPV vaccination drives down the prevalence of cervical precancer.¹³ Nonetheless, many barriers to implementing primary HPV screening have been recognized, including the test's suboptimal specificity (85–95%) and lack of consensus about screening initiation and intervals.^{14,15}

In line with other published studies, our survey also highlights two populations that are consistently overscreened – women younger than 21 years old and average risk women older than 65 with adequate past screening.^{16,17} Our study also highlights deviations from recommended screening intervals, where the majority of providers were utilizing cotesting, but incorrectly reporting screening intervals of 2 years or less. While this may lend a sense of safety, too frequent screening identifies trivial lesions fated to regress without causing cancer and increases cost, anxiety, and stigmatization. Thus, ongoing education for providers is needed to reduce potential harms of overutilization of screening tests for cervical cancer.

Deviations from management guidelines are equally prevalent, but less reported in the current literature. In 2010, Berkowitz and colleagues surveyed 950 primary care physicians including obstetrics and gynecologist, internists, and family practice providers, showing that even for the most common abnormal cervical cancer screening results (e.g. normal cervical cytology/HPV positive and ASC-US cervical cytology/HPV negative) physicians did not correctly report when to order the next cervical cytology test and HPV test.¹⁸ Our study expanded upon this framework by presenting 11 additional clinical vignettes and more specifically identified areas of suboptimal adherence – physicians pursued unnecessary HPV testing and/or LEEP for persistent low-grade results, yet undertreated HSIL in women 21–29-years-old. Based on incorrect responses, factors that appeared to deviate from guidelines pertained to the stratified management of high-grade results among “young women”, differentiating between observation for CIN 2 versus treatment for CIN 3 or those with inadequate colposcopy.²

Despite strong evidence supporting the cervical cancer screening and management guidelines, why are providers continuing to practice outside of them? First, humans have evolved towards risk aversion, and conceivably physicians overweigh the risks of cancer with less aggressive screening and management of CIN.¹⁹ Even though guidelines have been written to balance the benefits of cancer reduction and risks of harm and costs of

overscreening, physicians and patients alike do not perceive the benefits and risks as balanced. In fact, among 391 surveyed obstetrician-gynecologists, the majority were not convinced that the cervical cancer prevention guidelines were safer, and actually found them riskier and clinically inappropriate.²⁰ Even the physicians who believed the guidelines were authoritative intentionally disregarded them given the challenges of having to explain the implications of the new guidelines to skeptical patients.²⁰

With the new recommendations⁵ released in March 2020, how can our results improve adherence to the new recommendations released in March 2020? Given the complexity embedded in the current algorithms, it is not surprising that physician confusion and overload may be contributing to nonadherence. In these situations, providers often revert to overscreening as to “play it safe.”²⁰ In 2016, Boone et al published their survey results of 4,909 providers who perform cervical cancer screening and showed that 35% reported skepticism about the clinical appropriateness of the guidelines; however, among those who believed screening guidelines were reliable and clinically appropriate, 84.7% found the guidelines to be unclear. There was a statistically significant difference between the providers’ recommendations and the actual guidelines they believed they were following.²⁰ Taken together with our study results, where ASCCP mobile application users had higher median scores than non-app users, we recommend capitalizing on technological tools to enhance adherence to cervical cancer prevention strategies, and anxiously await access to the new online platform which is expected to replace the ASCCP mobile application.

This study has several limitations. First, our survey relies on self-reports of screening and management practices and has not been validated. However, Veloski and colleagues suggested that physician self-report of practice, especially through vignette-based surveys, is reliable.²¹ Second, our clinical vignettes may not reflect the diversity of women seen in clinical practice and they simply describe test results backed by guideline algorithms. This, however, highlights the underlying limitation of the guidelines themselves, as translating evidence-based interventions into clinical practice is incredibly complex and challenging. Third, our sample population was fairly limited in size, response rate, and practice settings, which may weaken the generalizability of our findings. However, our results mirror those of larger studies with varied populations.^{16,18,22,23}

Conclusion

Midwestern obstetrician-gynecologists demonstrate suboptimal adherence to the current evidence-based guidelines for cervical cancer screening and management of abnormal results and cancer precursors. While cotesting for women aged 30–65 years has been broadly adopted, screening and management strategies at large remain heterogeneous. Concerning areas of nonadherence include lack of adoption of primary HPV testing, premature screening initiation and tardy exit, over-aggressive treatment evaluation of persistent low-grade results, and inadequate treatment of younger women with high-grade results. With updated recommendations set to be released later in 2020, professional societies and educators must devise strategies for their adoption.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Abbreviations and acronyms

HPV	human papillomavirus
LSIL	low-grade squamous intraepithelial lesion
ASC-US	atypical squamous cells of undetermined significance
ACS	American Cancer Society
UPSTF	United States Preventative Services Task Force
ACOG	American College of Obstetricians and Gynecologists
IRB	Institutional Review Board
LEEP	loop electrosurgical excision procedure
AIS	adenocarcinoma in situ
HSIL	high-grade squamous intraepithelial lesion
CIN	cervical intraepithelial neoplasia

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Précis

A survey of Midwestern obstetrician-gynecologists showed that compared to guidelines, physicians tend to overscreen, overtreat low-grade lesions, and undertreat high-grade lesions in young women.

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Figure 1.
Percent of participants with suboptimal adherence vs. optimal adherence to ASCCP/ACS/
UPSTF/ACOG cervical cancer management guidelines by vignette category

Table 1.

Demographics and practice characteristics of participants who perform cervical cancer screening (N=116)

Variable	n (%)
Age	
30–40	46 (39.7)
41–50	35 (30.2)
51–60	22 (19.0)
>60	13 (11.2)
Gender	
Male	28 (24.1)
Female	88 (75.9)
Number of years in practice	
< 5	25 (21.6)
6–10	25 (21.6)
11–15	19 (16.4)
16–20	13 (11.2)
>20	34 (29.3)
OB/GYN Board Certified	101 (87.1)
Practice location	
Urban	53 (45.7)
Suburban	59 (50.1)
Rural	2 (1.7)
Other	2 (1.7)
OB/GYN subspecialty	
Generalist	77 (66.4)
Family Planning	8 (6.9)
Female Pelvic Medicine and Reconstructive Surgery	4 (3.4)
Gynecologic Oncology	9 (7.8)
Maternal Fetal Medicine	10 (8.6)
Minimally Invasive surgery	0 (0)
Pediatric, Adolescent, and Gynecology	4 (3.4)
Reproductive, Endocrine, and Infertility	4 (3.4)
Other	0 (0)
Primary practice	
Academic, university-based	46 (39.7)
Private practice	58 (50.0)
Other	12 (10.3)
Professional time is spent in clinical practice	
Part time (less than 50%)	10 (8.6)
Full time (more than or equal to 50%)	106 (91.4)

Variable	n (%)
Accepts Medicaid patients	108 (93.1)
Number of cervical cytology tests performed each month	
1–5	19 (16.4)
6–10	9 (7.8)
11–15	11 (9.5)
16–20	15 (12.9)
>20	62 (53.4)

The responses were self-reported by 116 Midwestern obstetrician-gynecologists collected through an online survey.

Table 2.

Cervical cancer screening practices

Survey question	n (%)
How do you screen women 30 years of age and older?	
Pap test	2 (1.7)
Pap and HPV co-testing	114 (98.3)
Primary HPV testing	0 (0)
Based on what screening test you selected above, how often do you recommend screening for women 30 years of age and older with no prior abnormality?	
Annually	8 (6.9)
Every 2 years	3 (2.6)
Every 3 years	34 (29.3)
Every 5 years	71 (61.2)
Do you screen women before 21 years of age?	
Yes, regardless of risk factors	4 (3.4)
Yes, if immunocompromised (e.g., HIV+)	44 (37.9)
No	68 (58.6)
How do you screen women 21–29 years of age?	
Pap test annually	17 (14.7)
Pap test every 3 years	81 (69.8)
Pap and HPV co-testing annually	4 (3.4)
Pap and HPV co-testing every 3 years	10 (8.6)
Pap and HPV co-testing every 5 years	2 (1.7)
I do not screen these women	1 (0.9)
Other	1 (0.9)
What screening do you recommend for women after total hysterectomy and no prior cervical cancer or CIN2+?	
Annual Pap test	2 (1.7)
Pap test every 3 years	2 (1.7)
Pap and HPV co-testing every 3 years	5 (4.3)
Pap and HPV co-testing every 5 years	2 (1.7)
No further screening	105 (90.5)
How do you use HPV testing?	
Only for routine screening (with Pap)	11 (9.5)
Only as follow-up for abnormal Pap	3 (2.6)
Both screening and follow-up	102 (87.9)

The responses were self-reported by 116 Midwestern obstetrician-gynecologists collected through an online survey.

Table 3.

Correlates of correctly addressing <50% of screening-related questions

Variables	Correctly addressed <50% of screening-related questions, N=43 n (%)	Correctly addressed 50% of screening-related questions N=73 n (%)
Age ***		
30–40	6 (13.9)	40 (54.8)
41–50	14 (32.6)	21 (28.8)
51–60	13 (30.2)	9 (12.3)
>60	10 (23.3)	3 (4.1)
Gender **		
Male	17 (39.5)	11 (15.1)
Female	26 (60.5)	62 (84.9)
Number of years in practice ***		
< 5	1 (2.3)	24 (32.9)
6–10	6 (13.9)	19 (26)
11–15	8 (18.6)	11 (15.1)
16–20	6 (13.9)	7 (9.6)
>20	22 (51.2)	12 (16.4)
OB/GYN Board Certified *		
Yes	41 (95.3)	60 (82.2)
No	2 (4.6)	13 (17.8)
Practice location ***		
Urban	7 (13.3)	46 (63.0)
Suburban	34 (79.1)	25 (34.2)
Rural	1 (2.3)	1 (1.4)
Other	1 (2.3)	1 (1.4)
OB/GYN subspecialty (NS)		
Generalist	30 (69.8)	47 (64.4)
Family Planning	2 (4.6)	6 (8.2)
Female Pelvic Medicine and Reconstructive Surgery	3 (7.0)	1 (1.4)
Gynecologic Oncology	4 (9.3)	5 (6.8)
Maternal Fetal Medicine	3 (7.0)	7 (9.6)
Minimally Invasive surgery	0 (0)	4 (5.5)
Pediatric, Adolescent, and Gynecology	1 (2.3)	3 (4.1)
Primary practice **		
Academic, university-based	9 (20.9)	37 (50.7)
Private practice	31 (72.1)	27 (37)
Other	3 (7.0)	9 (12.3)
Professional time is spent in clinical practice (NS)		

Variables	Correctly addressed <50% of screening-related questions, N=43 n (%)	Correctly addressed 50% of screening-related questions N=73 n (%)
Part time (less than 50%)	3 (7.0)	7 (9.6)
Full time (more than or equal to 50%)	40 (93.0)	66 (90.4)
Accepts Medicaid patients (NS)		
Yes	38 (88.4)	70 (95.9)
No	5 (11.6)	3 (4.1)
Number of cervical cytology tests performed each month **		
1–5	7(16.3)	12 (16.4)
6–10	3 (7)	6 (8.2)
11–15	0 (0)	11 (15.1)
16–20	2 (4.5)	13 (17.8)
>20	31 (72.1)	31 (42.5)

Chi-square or Fisher's exact tests were used to assess associations between physician characteristics and correctly addressing <50% of the six screening questions.

*
p<0.05

**
p<0.01

p<0.001

(NS) Not Significant