Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

HHS Public Access

Author manuscript

Prev Med. Author manuscript; available in PMC 2018 February 12.

Published in final edited form as:

Prev Med. 2017 December ; 105: 372–377. doi:10.1016/j.ypmed.2017.08.006.

Primary HPV testing recommendations of US providers, 2015

Crystale Purvis Cooper[a] and **Mona Saraiya**[b,*]

[a]Soltera Center for Cancer Prevention and Control, Tucson, AZ 85704, United States

[b]Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA 30341, United States

Abstract

Objective—To investigate the HPV testing recommendations of US physicians who perform cervical cancer screening.

Methods—Data from the 2015 DocStyles survey of U.S. health care providers were analyzed using multivariate logistic regression to identify provider characteristics associated with routine recommendation of primary HPV testing for average-risk, asymptomatic women ≥30 years old. The analysis was limited to primary care physicians and obstetrician-gynecologists who performed cervical cancer screening (N = 843).

Results—Primary HPV testing for average-risk, asymptomatic women ≥30 years old was recommended by 40.8% of physicians who performed cervical cancer screening, and 90.1% of these providers recommended primary HPV testing for women of all ages. The screening intervals most commonly recommended for primary HPV testing with average-risk, asymptomatic women ≥30 years old were every 3 years (35.5%) and annually (30.2%). Physicians who reported that patient HPV vaccination status influenced their cervical cancer screening practices were almost four times more likely to recommend primary HPV testing for average-risk, asymptomatic women ≥30 years old than other providers (Adj OR = 3.96, 95% CI = 2.82–5.57).

Conclusion—Many US physicians recommended primary HPV testing for women of all ages, contrary to guidelines which limit this screening approach to women ≥25 years old. The association between provider recommendation of primary HPV testing and patient HPV vaccination status may be due to anticipated reductions in the most oncogenic HPV types among vaccinated women.

Keywords

Cervical cancer screening; Providers; HPV testing; United States

*Corresponding author at: Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, CDC, 4770 Buford Hwy, MS K76, Atlanta, GA 30341, United States. msaraiya@cdc.gov (M. Saraiya).

Conflict of interest

The authors have no conflict of interests to disclose.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

1. Introduction

The US Food and Drug Administration approved a human papillomavirus (HPV) test that can distinguish vaccine HPV types from other oncogenic HPV types for primary cervical cancer screening in 2014 (Nelson, 2014). In 2015, the American Society for Colposcopy and Cervical Pathology (ASCCP) and the Society of Gynecology Oncology (SGO) issued clinical guidance recommending primary HPV testing every 3 years for women ≥25 years old as one of several screening strategies (Huh et al., 2015), and the American College of Obstetricians and Gynecologists (ACOG) recommended this screening strategy in 2016 (American College of Obstetricians and Gynecologists, 2016). However, primary screening with the HPV test has not been recommended by the American Cancer Society (ACS) (Saslow et al., 2012) and the US Preventive Services Task Force (USPSTF) (US Preventive Services Task Force, 2012), which endorse two screening options: 1) Papanicolaou (Pap) testing every 3 years for women 21–65 years old and 2) Pap testing every 3 years for women 21–29 years old followed by testing with both the Pap test and the HPV test (co-testing) administered every 5 years for women 30–65 years old.

This study investigated US physicians' HPV testing recommendations in 2015 to assess uptake of this newer screening strategy.

2. Methods

The 2015 DocStyles survey was administered online in June by Porter Novelli (Washington D.C.). Participants were recruited from SERMO's Global Medical Panel® (> 330,000 US health professionals, verified through telephone confirmation at their place of work). Participants included physicians practicing in a variety of settings (solo practices, group practices, managed care organizations, etc.), but were limited to providers who worked in the United States, actively saw patients, and had practiced for at least 3 years. The survey included a variety of provider groups, but the analyses reported here were limited to primary care physicians (internists and family practitioners) and obstetrician-gynecologists.

An invitation to participate in the survey was emailed to randomly-selected panel members —1569 (1122 primary care physicians and 347 obstetrician-gynecologists). Of this sample, 1250 (79.7%) comprised of 1000 primary care physicians and 250 obstetrician-gynecologists completed the survey. Quota sampling (Cumming, 1990) was used to ensure adequate representation of all provider groups surveyed; the quotas were filled: 1000 primary care physicians and 250 obstetrician-gynecologists. Fifty-eight (3.7% of sample, 44 primary care physicians and 14 obstetrician-gynecologists) were terminated based on screening questions; 30 (1.9% of sample, 23 primary care physicians and 7 obstetrician-gynecologists) did not complete the survey; 24 (1.5% of sample, 10 primary care physicians and 14 obstetrician-gynecologists) were terminated due to filled quotas; 107 (6.8%, 45 primary care physicians and 62 obstetrician-gynecologists) did not respond to the invitation to participate in the survey or responded after the survey closed. Of the 1250 providers who completed the survey, 407 (399 primary care physicians and 8 obstetrician-gynecologists) were excluded because they reported that cervical cancer screening was not within the scope

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

of their practice or performed no cervical cancer screening within a typical month, resulting in a sample of 843 (601 primary care physicians and 242 obstetrician-gynecologists).

Respondents were not required to participate and could exit the survey at any time. Respondents were paid $35–$80 depending on specialty. The survey questions analyzed in the present study were developed by multi-disciplinary team of researchers from CDC and Porter Novelli. The study complied with the ICC/ESOMAR International Code for ethical research (ESOMAR, 2008) and was not subject to CDC IRB review as it involved secondary data analysis, and no individual identifiers were included in the dataset received by investigators.

In addition to providing demographic characteristics and practice information, respondents rated the influence of four factors on their cervical cancer screening practices: “clinical experience,” “patient preference,” “patient HPV vaccination status,” and “practice guidelines.” Responses provided were “not at all,” “slightly,” “somewhat,” and “very much” and were dichotomized into “does not influence” (“not at all” and “slightly”) and “influences” (“somewhat” and “very much”).

Respondents were also asked which cervical cancer screening options and intervals they routinely recommended to average-risk, asymptomatic women in three age groups: “24 years and younger,” “25–29 years,” and “30 years and older.” Screening options listed for each age group of patients were “co-testing (Pap test in combination with HPV test),” “Pap test alone,” and “HPV test alone” (screening options were listed in this order together in a single block beneath each age-specific scenario). Responses provided were “do not recommend,” “annual,” “every 2 years,” “every 3 years,” “every 4 years,” “every 5 years,” and “other.” A single response was accepted for each screening option. Routine recommendation of HPV test alone was dichotomized into “do not recommend” and “recommend” (all other responses).

Pairwise Pearson Chi-square tests were performed to test the associations between the routine recommendation of primary HPV testing for average-risk, asymptomatic women ≥30 years old and provider characteristics. Variables significantly associated ($p < 0.05$) with routine recommendation of primary HPV testing in the bivariate analyses were included in a forward stepwise multivariate logistic regression model predicting routine recommendation of primary HPV testing for average-risk, asymptomatic women ≥30 years old. The data were analyzed in 2016 using IBM SPSS Statistics 21.0.

3. Results

The most common influences on cervical cancer screening practices were practice guidelines (89.1%) and clinical experience (73.1%) (Table 1). For average-risk, asymptomatic women, the Pap test alone was the most popular screening recommendation for women < 25 years old (81.4%) and 25–29 years old (80.9%), and co-testing was recommended most often for women ≥30 years old (94.4%).

Primary HPV testing for average-risk, asymptomatic women ≥30 years old was recommended by 40.8% of physicians who performed cervical cancer screening. Among

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

these, 90.1% (36.8% of sample) recommended primary HPV testing for women of all ages (< 25 years old, 25–29 years old, and ≥30 years old). The screening intervals most commonly recommended for primary HPV testing for average-risk, asymptomatic women ≥30 years old were every 3 years (35.5%) and annually (30.2%) (Fig. 1).

In the bivariate analyses, routine recommendation of primary HPV testing to average-risk, asymptomatic women ≥30 years old was more likely among internists, male providers, Asian providers, Hispanic providers, and providers who reported that their cervical cancer screening practices were influenced by patient preference or patient HPV vaccination status (Table 2). And, routine recommendation of primary HPV testing to average-risk, asymptomatic women ≥30 years old was less likely among providers who screened ≥45 women for cervical cancer during a typical month, and providers who reported that practice guidelines influenced their cervical cancer screening practices. Years in practice, number of providers in practice, teaching hospital privileges, region, financial status of majority of patients treated, and one of the four factors influencing cervical cancer screening practices (clinical experience) were not associated with routine recommendation of primary HPV testing to average-risk, asymptomatic women ≥30 years old.

In the adjusted logistic regression model, physicians who reported that patient HPV vaccination status influenced their cervical cancer screening practices were almost four times more likely to routinely recommend primary HPV testing to average-risk, asymptomatic women ≥30 years old than other providers (Table 3). The observed associations with specialty, gender, race, ethnicity, and practice guidelines influencing cervical cancer screening practices also persisted in the adjusted model.

4. Discussion

The Pap test alone and co-testing remained the dominant cervical cancer screening modalities recommended by providers, but > 40% recommended primary HPV testing. This result was surprising given the recency of SGO/ASCCP (Huh et al., 2015) and ACOG (American College of Obstetricians and Gynecologists, 2016) recommendations for primary HPV testing, and the absence of guidelines on this screening strategy from ACS (Saslow et al., 2012) and USPSTF (US Preventive Services Task Force, 2012). However, prior national surveys of US providers found widespread agreement that the HPV test administered alone is an effective screening modality in 2012 (79.5%–91.8%, depending on provider specialty) and 2009 (75.3%–86.1%) (Cooper and Saraiya, 2015).

Provider HPV testing recommendations were not consistent with available guidance. Most providers who endorsed primary HPV testing in our survey recommended it for women of all ages, despite guidance to limit this strategy to women ≥25 years old (Huh et al., 2015; American College of Obstetricians and Gynecologists, 2016). The rationale for extending primary HPV testing to younger women is not clear, but may be indicative of a universal screening mentality or a lack of understanding that the HPV infection in teenagers and women in their early 20’s often resolves or clears without intervention (Boardman and Robison, 2013). Many providers also followed an annual or 2-year screening interval for primary HPV testing, despite recommendations for a 3-year interval (Huh et al., 2015;

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

American College of Obstetricians and Gynecologists, 2016) and evidence in other countries which supports the effectiveness of even longer intervals, up to 10 years (Peto and Gilham, 2017; Elfström et al., 2014; Dillner et al., 2008; Gage et al., 2014; Isidean et al., 2016). This preference for more frequent screening may reflect a lack of familiarity with screening recommendations (Isidean et al., 2016), concerns about maintaining visit volume (Henderson et al., 2014) or patient preference (Teoh et al., 2015; Gerend et al., 2017). Primary HPV testing of women younger than recommended and screening more frequently than recommended will likely result in increased colposcopy referrals (Boardman and Robison, 2013) and adverse birth outcomes (Bjørge et al., 2016), with no accompanying rise in the detection of high-grade cervical disease.

The strongest predictor of routine recommendation of primary HPV testing in the adjusted model was patient HPV vaccination status. Physicians who reported that patient HPV vaccination status influenced their cervical cancer screening practices were almost four times more likely to routinely recommend primary HPV testing for average-risk, asymptomatic women ≥30 years old. It is possible that providers familiar with HPV vaccination know that high coverage can result in less HPV infection of vaccine types and are aware that future screening can differentiate the most oncogenic types—HPV 16/18, the same types in the first generation vaccines—from other types. HPV vaccination has been associated with significant decreases in cervical pre-cancers in the US (Benard et al., 2016) and the Netherlands (Dijkstra et al., 2016). Similarly, high coverage of the HPV vaccine in Australia has resulted in a reduction in HPV 16/18 infections, genital warts, and cervical pre-cancers (Brotherton et al., 2016). As a result, Australia has changed from Pap-based screening starting at age 18 every 2 years to a strategy of primary HPV testing every 5 years starting at age 25 (Australian Government Department of Health, 2017). It should be noted that the full impact of HPV vaccination may yet to be fully understood. Specifically, HPV vaccination may reduce the positive predictive value of colposcopy (Munro et al., 2017), and additional implications of population-based uptake of the vaccine may emerge over time.

In the adjusted model, internists were more likely to recommend primary HPV testing than other providers. However, a previous study found that internists were less likely to report that primary HPV testing is an effective population-based screening modality than other provider groups (Cooper and Saraiya, 2015). It is not clear why internists more often recommended primary HPV testing in the present study. In prior research, internists were found to be less compliant with cervical cancer screening guidelines than other providers (Corbelli et al., 2014). Similarly, internists in the present study more often recommended primary HPV testing annually or every 2 years for women of all ages (despite SGO/ASCCP interim guidance and ACOG recommendations that primary HPV testing be administered every 3 years and reserved for women ≥25 years (Huh et al., 2015; American College of Obstetricians and Gynecologists, 2016)). It should also be noted that more than half of internists (55.9%) who participated in the 2015 DocStyles survey on which the present study was based were excluded from the analyses because they did not perform cervical cancer screening. This high rate of opting out of cervical cancer screening among internists is consistent with prior research (Cooper and Saraiya, 2014). Thus, internists who perform cervical cancer screening should be considered a subset of the US internist population at large. In addition, physicians who indicated that practice guidelines did not influence their

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

cervical cancer screening practices were more likely to routinely recommend primary HPV testing, which is consistent with the lack of inclusion of this screening option at present in the recommendations issued by major organizations (Saslow et al., 2012; US Preventive Services Task Force, 2012). Finally, the associations found between routine recommendation of primary HPV testing and gender, race, and ethnicity are interesting and need to be explored further.

The primary limitation of the present study is its reliance on self-reported data. No comparison data for the results reported here were identified, and the use of quota sampling (Cumming, 1990) in the present study limits generalizability. However, physicians who participated in the 2015 DocStyles surveys were found to be comparable with providers in the American Medical Association (AMA) Masterfile® in terms of gender, age, and geographic region (Porter Novelli, 2015). It is not known whether providers who responded to the survey after sampling quotas were filled or did not respond at all differed from providers included in the study. Also, it is important to emphasize that the extent to which provider recommendation of primary HPV testing, the focus of this study, translates into actual use is not known. Providers were asked about their screening recommendations in a hypothetical context, and no validation data from medical record review or other sources was available.

Primary HPV testing in the United States may be out of sync with current guidelines. ACS and USPSTF have not endorsed primary HPV testing, and the guidance issued by SGO/ASCCP (Huh et al., 2015) and ACOG (American College of Obstetricians and Gynecologists, 2016) limit this screening approach to women ≥25 years old. Yet, four out of 10 providers reported recommending primary HPV testing to women of all ages. No firm consensus on the appropriate screening intervals emerged, but both providers in the current study and women (Ogilvie et al., 2013) appear to be less supportive of primary HPV testing intervals longer than 3 years. Provider support for annual HPV testing was especially troubling. Annual cervical cancer screening is not recommended for women at any age by any modality. Given lower test specificity, over-screening with the HPV test is associated with greater peril than over-screening with the Pap test (Naber et al., 2016). Increased detection of transient HPV infections, particularly in younger women, will augment unnecessary diagnostic procedures and follow-up For over-screened women, HPV testing (either stand alone or co-testing) may cause more harm than benefit. Increasing providers' and women's acceptance and adoption of recommended screening intervals is an urgent public health objective as HPV testing and vaccination become part of a comprehensive prevention strategy.

Acknowledgments

This study was funded by the *Inside Knowledge: Get the Facts about Gynecologic Cancer* campaign of the Centers for Disease Control and Prevention (CDC). However, the findings and conclusions in this report are those of the authors and do not necessarily represent the official position of CDC.

References

American College of Obstetricians and Gynecologists. Cervical cancer screening and prevention. Practice bulletin no 157. Obstet Gynecol. 2016; 127(1):e1–20. [PubMed: 26695583]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Australian Government Department of Health. National Cervical Screening Program Medical Services Advisory Committee recommendations. 2017. www.cancerscreening.gov.au/internet/screening/publishing.nsf/Content/MSAC-recommendations, Accessed date: 7 August 2017

Benard, VB., Castle, PE., Jenison, SA., et al. Population-based incidence rates of cervical intraepithelial neoplasia in the human papillomavirus vaccine era. JAMA Oncol. 2016. http://dx.doi.org/10.1001/jamaoncol.2016.3609

Bjørge T, Skare GB, Bjørge L, et al. Adverse pregnancy outcomes after treatment for cervical intraepithelial neoplasia. Obstet Gynecol. 2016; 128(6):1265–1273. [PubMed: 27824756]

Boardman LA, Robison K. Screening adolescents and young women. Obstet Gynecol Clin N Am. 2013; 40(2):257–268. http://dx.doi.org/10.1016/j.ogc.2013.02.007.

Brotherton JM, Gertig DM, May C, et al. HPV vaccine impact in Australian women: ready for an HPV-based screening program. Med J Aust. 2016; 204(5):184. [PubMed: 26985843]

Cooper CP, Saraiya M. Opting out of cervical cancer screening: physicians who do not perform pap tests. Am J Prev Med. 2014; 47(3):315–319. http://dx.doi.org/10.1016/j.amepre.2014.04.018. [PubMed: 24953518]

Cooper CP, Saraiya M. Perceived effectiveness of HPV test as a primary screening modality among US providers. Prev Med. 2015; 78:33–37. http://dx.doi.org/10.1016/j.ypmed.2015.06.007. [PubMed: 26116889]

Corbelli J, Borrero S, Bonnema R, et al. Differences among primary care physicians' adherence to 2009 ACOG guidelines for cervical cancer screening. J Women's Health. 2014; 23(5):397–403. http://dx.doi.org/10.1089/jwh.2013.4475.

Cumming RG. Is probability sampling always better? A comparison of results from a quota and a probability sample survey. Community Health Stud. 1990; 14(2):132–137. [PubMed: 2208977]

Dijkstra MG, van Zummeren M, Rozendaal L, et al. Safety of extending screening intervals beyond five years in cervical screening programmes with testing for high risk human papillomavirus: 14 year follow-up of population based randomised cohort in the Netherlands. BMJ. 2016; 355:i4924. http://dx.doi.org/10.1136/bmj.i4924. [PubMed: 27702796]

Dillner J, Rebolj M, Birembaut P, et al. Long term predictive values of cytology and human papillomavirus testing in cervical cancer screening: joint European cohort study. BMJ. 2008; 337:a1754. [PubMed: 18852164]

Elfström KM, Smelov V, Johansson AL, Eklund C, Nauclér P, Arnheim-Dahlström L, Dillner J. Long term duration of protective effect for HPV negative women: follow-up of primary HPV screening randomised controlled trial. BMJ. 2014; 348:g130. [PubMed: 24435414]

ESOMAR. The ICC/ESOMAR Code. 2008. Available at. www.esomar.org/knowledge-and-standards/codes-and-guidelines.php, Accessed date: 7 August 2017

Gage JC, Katki HA, Schiffman M, et al. The low risk of precancer after a screening result of human papillomavirus-negative/atypical squamous cells of undetermined significance papanicolaou and implications for clinical management. Cancer Cytopathol. 2014; 122(11):842–850. [PubMed: 25045058]

Gerend MA, Shepherd MA, Kaltz EA, et al. Understanding women's hesitancy to undergo less frequent cervical cancer screening. Prev Med. 2017; 95:96–102. http://dx.doi.org/10.1016/j.ypmed.2016.11.028. [PubMed: 27932055]

Henderson JT, Yu JM, Harper CC, Sawaya GF. U.S. clinicians' perspectives on less frequent routine gynecologic examinations. Prev Med. 2014; 62:49–53. http://dx.doi.org/10.1016/j.ypmed.2014.02.004. [PubMed: 24518004]

Huh WK, Ault KA, Chelmow D, et al. Use of primary high-risk human pa-pillomavirus testing for cervical cancer screening: interim clinical guidance. Gynecol Oncol. 2015; 136(2):178–182. [PubMed: 25579107]

Isidean SD, Mayrand MH, Ramanakumar AV, et al. Human papillomavirus testing versus cytology in primary cervical cancer screening: end-of-study and extended follow-up results from the Canadian cervical cancer screening trial. Int J Cancer. 2016; 139(11):2456–2466. [PubMed: 27538188]

Munro, A., Gillespie, C., Cotton, S., et al. The impact of HPV type on colposcopy performance in women offered HPV immunisation in a catch-up vaccine programme: a two centre observational study. BJOG Int J Obstet Gynaecol. 2017. http://dx.doi.org/10.1111/1471-0528.14563

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Naber SK, de Kok IM, Matthijsse SM, van Ballegooijen M. The potential harms of primary human papillomavirus screening in over-screened women: a microsimulation study. Cancer Causes Control. 2016; 27(4):569–581. http://dx.doi.org/10.1007/s10552-016-0732-7. [PubMed: 26970740]

Nelson, R. FDA OKs HPV DNA test for primary cervical cancer screening. 2014. Available at. www.medscape.com/viewarticle/824114. Accessed date: 7 August 2017

Ogilvie GS, Smith LW, van Niekerk DJ, et al. Women's intentions to receive cervical cancer screening with primary human papillomavirus testing. Int J Cancer. 2013; 133(12):2934–2943. [PubMed: 23754203]

Peto, J., Gilham, C. Longer screening intervals are recommended following a negative HPV test in primary cervical screening. Evid Based Med. 2017. http://dx.doi.org/10.1136/ebmed-2016-110625

Porter Novelli. DocStyles 2015 Methods. Porter Novelli; Washington DC: 2015.

Saslow D, Solomon D, Lawson HW, et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. CA Cancer J Clin. 2012; 62(3):147–172. [PubMed: 22422631]

Teoh DG, Marriott AE, Isaksson Vogel R, Marriott RT, Lais CW, Downs LS Jr, Kulasingam SL. Adherence to the 2012 national cervical cancer screening guidelines: a pilot study. Am J Obstet Gynecol. 2015; 212(1):e1–e9. http://dx.doi.org/10.1016/j.ajog.2014.06.057.

US Preventive Services Task Force. Screening for cervical cancer: US Preventive Services Task Force recommendation statement. Ann Intern Med. 2012; 156(12):880–891. [PubMed: 22711081]

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

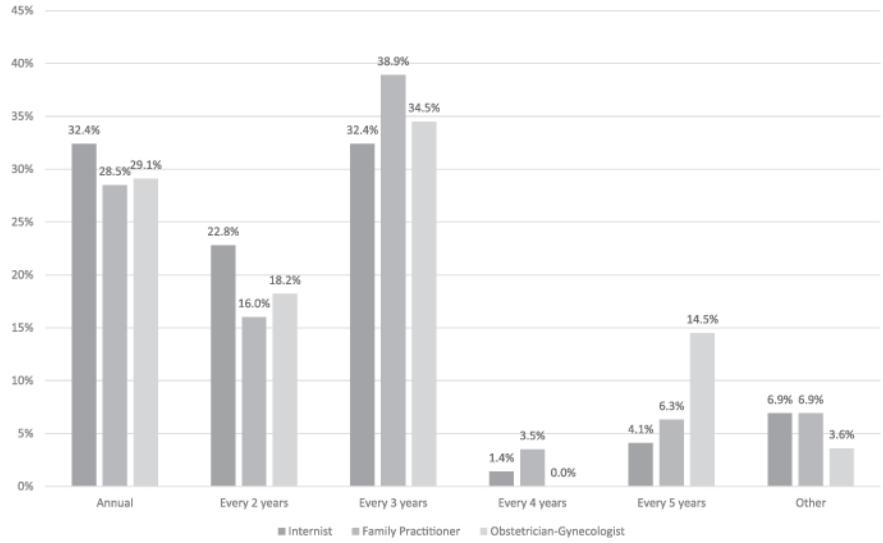

Fig. 1.

Screening interval recommended for primary human papillomavirus (HPV) testing with average-risk, asymptomatic women ≥30 years by provider group, DocStyles survey, 2015. Note: Analyses were limited to physicians who recommended primary HPV screening for average-risk asymptomatic women ≥30 years old (145 internists, 144 family practitioners, and 55 obstetrician-gynecologists).

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 1

Characteristics of US providers who perform cervical cancer screening by specialty (%), DocStyles survey, 2015.

Characteristic	Responses	Internist (n = 236)	Family practitioner (n = 365)	Obstetrician-gynecologist (n = 242)	Total (N = 843)
Gender	Male	73.7	66.8	59.1	66.5
	Female	26.3	33.2	40.9	33.5
Race	White	50.8	63.3	72.7	62.5
	Asian	36.0	27.1	16.5	26.6
	Black	1.7	1.9	2.9	2.1
	Other	11.4	7.7	7.9	8.8
Hispanic ethnicity	Yes	3.8	5.8	2.5	4.3
	No	96.2	94.2	97.5	95.7
Years in practice	< 10	26.7	27.4	19.0	24.8
	10–19	42.4	43.6	32.6	40.1
	≥20	30.9	29.0	48.3	35.1
Number of practitioners in practice	1 (solo practitioner)	12.3	11.5	18.6	13.8
	2–4	25.8	29.9	25.6	27.5
	5–9	24.6	30.7	24.8	27.3
	≥10	37.3	27.9	31.0	31.4
Teaching hospital privileges	Yes	56.4	38.6	63.2	50.7
	No	43.6	61.4	36.8	49.3
Geographic region	Northeast	22.0	16.2	26.0	20.6
	South	31.8	33.4	30.6	32.1
	Midwest	22.5	31.2	21.1	25.9
	West	23.7	19.2	22.3	21.4
Financial status of majority of patients treated	Poor (< $25,000)	5.9	5.5	5.4	5.6
	Lower middle ($25,000–$49,999)	20.3	24.7	22.7	22.9
	Middle ($50,000–$99,999)	35.6	36.2	34.3	35.5
	Upper middle ($100,000–$249,999)	25.0	23.0	20.2	22.8
	Affluent (≥$250,000)	13.1	10.7	17.4	13.3
Number of cervical cancer screenings performed during a typical month	1–14	53.8	41.6	4.5	34.4
	15–44	29.2	44.1	16.9	32.1

Prev Med. Author manuscript; available in PMC 2018 February 12.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Characteristic	Responses	Internist (n = 236)	Family practitioner (n = 365)	Obstetrician-gynecologist (n = 242)	Total (N = 843)
Factors influencing cervical cancer screening practices[a]	≥45	16.9	14.2	78.5	33.5
	Practice guidelines	83.9	89.9	93.0	89.1
	Clinical experience	70.8	72.1	76.9	73.1
	Patient preference influences	64.0	59.5	55.4	59.5
	Patient HPV vaccination status	63.1	55.3	25.6	49.0
Screening options recommended for average-risk, asymptomatic women < 25 years old	Pap test alone	83.1	77.5	85.5	81.4
	Co-testing (Pap test in combination with HPV test)	85.2	80.5	50.4	73.2
	HPV test alone	61.0	43.0	23.6	42.5
Screening options recommended for average-risk, asymptomatic women 25–29 years old	Pap test alone	83.5	77.5	83.5	80.9
	Co-testing	85.2	81.4	48.8	73.1
	HPV test alone	60.2	42.7	22.3	41.8
Screening options recommended for average-risk, asymptomatic women ≥30 years old	Pap test alone	81.4	69.0	55.4	68.6
	Co-testing	94.5	93.7	95.5	94.4
	HPV test alone	61.4	39.5	22.7	40.8
Screening options recommended for average-risk, asymptomatic women of all ages[b]	Pap test alone	75.8	65.2	53.3	64.8
	Co-testing	79.2	72.6	44.2	66.3
	HPV test alone	53.8	37.5	19.0	36.8

Note: Analyses were limited to physicians who reported that cervical cancer screening was within the scope of their practice and performed cervical cancer screening during a typical month.

[a] Influences cervical cancer screening practices “somewhat” or “very much.”

[b] Women of all ages includes< 25 years old, 25–29 years old, and ≥30 years old.

Author Manuscript Author Manuscript Author Manuscript Author Manuscript

Table 2

Provider characteristics by routine recommendation of primary human papillomavirus (HPV) testing for average-risk, asymptomatic women ≥30 years, DocStyles survey, 2015 (N = 843).

Characteristic	Responses	Primary HPV testing for average-risk, asymptomatic women ≥30 years		p[a]
		Does not recommend (%)	Recommends (%)	
Specialty	Internist	38.6	61.4	< 0.001
	Family practitioner	60.5	39.5	
	Obstetrician-gynecologist	77.3	22.7	
Gender	Male	54.7	45.3	< 0.001
	Female	68.1	31.9	
Race	White	64.7	35.3	< 0.001
	Asian	45.5	54.5	
	Black	83.3	16.7	
	Other	55.4	44.6	
Hispanic ethnicity	Yes	41.7	58.3	0.03
	No	60.0	40.0	
Years in practice	< 10	58.4	41.6	0.78
	10–19	58.3	41.7	
	≥20	60.8	39.2	
Number of practitioners in practice	Solo practitioner	61.2	38.8	0.45
	2–4	54.7	45.3	
	5–9	60.4	39.6	
	≥10	61.1	38.9	
Teaching hospital privileges	Yes	58.8	41.2	0.81
	No	59.6	40.4	
Geographic region	Northeast	59.2	40.8	0.67
	South	56.5	43.5	
	Midwest	61.9	38.1	
	West	60.0	40.0	
Financial status of majority of patients treated	Poor (< $25,000)	74.5	25.5	0.06
	Lower middle ($25,000–$49,999)	64.2	35.8	
	Middle ($50,000–$99,999)	55.9	44.1	
	Upper middle ($100,000–$249,999)	55.7	44.3	
	Affluent (≥$250,000)	58.9	41.1	
Number of cervical cancer screenings performed during a typical month	1–14	53.8	46.2	0.004
	15–44	56.8	43.2	
	≥45	67.0	33.0	
Factors influencing cervical cancer screening practices[b]	Practice guidelines	60.7	39.3	0.01
	Clinical experience	58.8	41.2	0.68
	Patient preference influences	52.2	47.8	< 0.001

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Characteristic	Responses	Primary HPV testing for average-risk, asymptomatic women ≥30 years		p[a]
		Does not recommend (%)	Recommends (%)	
	Patient HPV vaccination status	40.7	59.3	< 0.001

Note: Analyses were limited to physicians who reported that cervical cancer screening was within the scope of their practice and performed cervical cancer screening during a typical month.

[a]Percentages were compared using Pearson Chi-square asymp. two-sided tests.

[b]Influences cervical cancer screening practices “somewhat” or “very much.”

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 3

Significant predictors of routine recommendation of primary human papillomavirus (HPV) testing for average-risk, asymptomatic women ≥30 years old among US providers who perform cervical cancer screening, multivariate logistic regression, DocStyles survey, 2015 (N = 843).

Significant predictors	Predictive category	Adj. OR	95% CI	Reference category
Specialty	Family practitioner	0.44	0.30–0.63	Internist
	Obstetrician-gynecologist	0.31	0.18–0.52	
Gender	Male	1.56	1.11–2.21	Female
Race	Asian	1.95	1.36–2.81	White
	Black	0.46	0.12–1.80	
	Other	0.96	0.54–1.70	
Hispanic ethnicity	Yes	2.38	1.09–5.20	No
Factors influencing cervical cancer screening practices	Influenced by patient HPV vaccination status	3.96	2.82–5.57	Not influenced by patient HPV vaccination status
	Influenced by practice guidelines	0.45	0.27–0.74	Not influenced by practice guidelines

Note: Table includes variables in the multivariate model with one or more significant categories. The forward, stepwise multivariate model included variables significantly associated with routine recommendation of primary HPV testing for average-risk, asymptomatic women in bivariate analyses (Table 2): specialty, gender, race, ethnicity, number of cervical cancer screenings performed during a typical month, and three influences on cervical cancer screening practices—practice guidelines, patient preference, and patient HPV vaccination status. Analyses were limited to physicians who reported that cervical cancer screening was within the scope of their practice and performed cervical cancer screening during a typical month.