Longitudinal study of advanced practice nurses' implementation of screening intervals for cervical cancer screening

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ABSTRACT

Background and purpose: The past two decades brought changes in cervical cancer screening guidelines. Frequent modifications and earlier lack of agreement about recommendations created confusion. The purpose of this study was to explore to what extent advanced practice nurses (APNs) adopted cervical cancer screening guidelines.

Methods: A longitudinal survey of 358 APNs conducted in three New England states regarding cervical cancer screening practices in 2008, 2012, and 2015.

Conclusions: Advanced practice nurses are incorporating guidelines at a high rate. Advanced practice nurses found it easier to incorporate guidelines to delay screening until the age of 21 years, to discontinue screening after total hysterectomy for benign reasons, and to discontinue screening at the age of 65 years. In 2012, 15% of APNs were screening women aged 21–29 years every 3 years; by 2015, this rate rose to 72%. By 2015, half of APNs were screening low-risk women aged 30–64 every 5 years. Because screening practices changed, APNs questioned the need to perform screening pelvic and breast examinations. Advanced practice nurses no longer perform screening pelvic examinations (93%) or breast examinations (75%) in adolescents.

Implications for practice: Some APNs indicated that office-based practice standards are barriers to adherence to guidelines. Advanced practice nurses need to be involved in practice committees to ensure that evidence guides practice decisions.

Keywords: Adolescents; advanced practice nurse; cervical cancer screening; clinical practice guidelines; nurse practitioners; Papanicolaou test; women.

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Introduction

Screening for cervical cancer and precancerous changes is one of the great success stories of preventative medicine. Historically, cervical cancer was a major cause of death among women of reproductive age (National Institutes of Health, 2010). The introduction of the Papanicolaou (Pap) smear in the 1950s is credited with reducing both the incidence and mortality from cervical cancer in the United States by more than 60% (Siegal, Miller, & Jemal, 2016). In 1988, the Bethesda system for reporting a cervical or vaginal cytological diagnosis was introduced to establish a uniform terminology and standardize diagnostic reporting (National Cancer Institute, 1989). In September of 2001, the American Society for Colposcopy and Cervical Pathology (ASCCP) consensus conference developed management guidelines related to abnormal Pap smear results based on a better understanding of the pathogenesis of the human papillomavirus (HPV) and of the availability of liquid-based cytology (Wright, Cox, Massad, Twiggs, & Wilkinson, 2002). In 2006, the Natural Institutes of Health, ASCCP, and the American Cancer Society (ACS) recommended HPV DNA testing in addition to cervical cytology for screening in women aged 30 years and older (Wright et al., 2007). The majority of the 2006 guidelines focused on the management of abnormal findings with little change to screening guidelines. From 2001 to 2015, there were more changes in screening, reporting, and management of cervical cancer than in the prior 50 years (Table 1).

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Table 1. Summary of cervical cancer screening guidelines

	2002	2006–2008 Most Guidelines Focused on Management of Abnormal Findings, Not on Screening	2012
Source		American Cancer Society, 2002	
Initiating	Within 3 years of initiating vaginal intercourse, not later than the age of 21 years	Unchanged	Age 21 years
Ages 21–29	Conventional Pap smear yearly, every 2 years with liquid cytology	Unchanged	Cytology alone every 3 years
Ages 30–65/70	Every 2–3 years after 3 consecutive normal results with conventional- or liquid-based tests. Every 3 years with cotesting with HPV and cytology.	Unchanged	HPV and cytology cotesting every 5 years (preferred); cytology alone every 3 years (acceptable)
D/C	Age > 70 years with 3 recent, consecutive negative tests and no abnormal tests in the past 10 years	Unchanged	No screening after the age of 65 years[a]
HYST	No screening[b]	No screening[b]	No screening[b]
Source		USPSTF	
Initiating	Within 3 years of onset of sexual activity or the age of 21 years, whichever comes first	Unchanged	Age 21 years
Ages 21–29	Conventional Pap smear every 3 years. Insufficient evidence for liquid-based Pap smear or HPV cotesting.	Unchanged	Cytology alone every 3 years
Ages 30–65/70	Conventional Pap smear every 3 years. Insufficient evidence for liquid-based Pap smear or HPV cotesting	Unchanged	HPV and cytology cotesting every 5 years (preferred); cytology alone every 3 years (acceptable)
D/C	Age 65[a]	Age 65[a]	Age 65 years[a]
HYST	No screening[b]	No screening[b]	No screening[b]
Source		ACOG	
Initiating	Same as ACS: Within 3 years of initiating vaginal intercourse, not later than the age of 21 years	Age 21 years	Age 21 years
Ages 21–29	Annually	Every 2 years	Cytology alone every 3 years
Ages 30–65/70	Same as ACS: Every 2–3 years after 3 consecutive normal results with conventional- or liquid-based Pap smears; HPV cotesting: every 3 years if cotesting with HPV negative, cytology negative	Every 3 years after 3 consecutive normal results	HPV and cytology cotesting every 5 years (preferred); cytology alone every 3 years (acceptable)
D/C	Inconclusive evidence to establish upper age limit	Age 65–70 years[a]; a sexually active woman with multiple partners should have routine screening.	Age 65 years[a]

(*continued*)

Table 1. Summary of cervical cancer screening guidelines, *continued*

	2002	2006–2008 Most Guidelines Focused on Management of Abnormal Findings, Not on Screening	2012
HYST	No screening[b]	No screening[b]	No screening[b]
Source		American Geriatric Society	
D/C	Age 70 years	Age 70 years	Age 65 years[a]

Note: ACS = American Cancer Society; HPV = human papillomavirus.
[a]No screening after adequate negative prior screening. Women with a history of CIN2 or a more severe diagnosis should continue routine screening for at least 20 years.
[b]Applies to women without a cervix and without a history of CIN2 or a more severe diagnosis in the past 20 years.

The frequent changes and the lack of agreement among screening recommendations from professional health organizations led to confusion on the part of patients and clinicians. In 2012, for the first time, all professional organizations including the ACS, ASCCP, American Society for Clinical Pathology (ASCP), the U.S. Preventive Services Task Force (USPSTF), American College of Obstetricians and Gynecologists (ACOG), American Geriatric Society, and the American College of Physicians agreed on cervical cancer screening guidelines (Massad et al., 2013; Saslow et al., 2012). The changing guidelines prompted the authors' interest in how advanced practitioner nurses (APNs) adopt a change into their practice and were the impetus for this study. When reviewing the results of the study, the following must be kept in mind: the cervical cancer screening guidelines do not apply to women who are immunosuppressed and have a history of cervical cancer or in utero exposure to diethylstilbestrol (Saslow et al., 2012).

Methods

Our objective was to conduct a longitudinal study of APN's incorporation of cervical cancer screening guidelines over time. There were no validated questionnaires already in use that were suitable for the purposes of this research. Before sending the survey questionnaire to the target sample, the survey was reviewed by a committee of providers including APNs in the Dartmouth Primary Care Research Network for content and face validity. We chose 2008 to capture the initial rate of incorporation of guidelines promulgated in 2006. In 2012, we repeated the survey to assess the rate of incorporation of guidelines. Shortly after our 2012 survey, the USPSTF and the ACOGs endorsed the guidelines promulgated by the ACS, ASCCP, and the ASCP, which meant that all groups were now in alignment with their guidelines. We hypothesized that the consensus regarding the guidelines would encourage APN's uptake of the guidelines. In 2015, we repeated the survey to test this hypothesis. Most questions were the same in each survey. However, as guidelines changed, questions were edited to reflect current practice. For example, the recommendation to extend the screening intervals from 3 to 5 years in women aged 30–65 years required an edit in the question in 2015. Because cervical cancer screening rates were extended, APNs were discussing whether to perform a screening pelvic examination if a Pap smear was not needed on the visit. Thus, beginning in 2012, we added survey questions about delaying breast and pelvic examinations in adolescent women. We were unable to track whether respondents had participated in previous surveys.

Eligibility for the study included any APN licensed in the states of New Hampshire, Vermont, or Massachusetts and who was a member of their respective professional organization. Each of the three states had freestanding nurse practitioner (NP) professional organizations that were separate from the State Nurses Association. Initially, the survey was distributed through the professional list serve of the NP associations of the three states. Some organizations distributed the survey directly to members and others posted the survey information and link on their website; the mechanism of distribution of a given organization differed from year to year. To supplement the response, paper copies of the survey were distributed at annual meetings of each state NP organization (which included nurse midwives). If permitted, copies of the survey were placed on the table of the professional association in the vendor hall. Given the variety of mechanisms for recruitment, it was not possible to calculate a response rate. Institutional review board approval was secured through Dartmouth Medical School in 2008 and 2012 and from the University of New Hampshire in 2015. SPSS was used for statistical analysis.

Results

In terms of demographics, we asked 352 respondents to identify their profession as NP (women's health, family, pediatrics, or internal medicine), certified nurse midwife

Table 2. Demographic information

Year	No. of Respondents (Total = 352)	Family	Internal Medicine	Women's Health (NP/CNM)	Pediatrics	Other: Dually Certified
Question 1: No. of participants and areas of practice[a]						
2008	47	56%	32%	18%	18%	0%
2012	120	52%	21%	14%	7%	7%
2015	195	53%	23%	23%	1%	9%

Note: CNM = certified nurse midwife; NP = nurse practitioner.
[a]No statistically significant dierence between practice types at 95% confidence interval testing.

(CNM), or other. Most of the respondents were NPs (98–99% depending on the year) or CNMs (1–1.7% depending on the year). Overall, there was no statistically significant difference in response rates among all provider types by 95% confidence interval testing. In terms of practice setting, the total number of CNM respondents was low, so their results are included in the category of the women's health practice setting. The total number of respondents in NP pediatric settings was also low; they are included in total numbers, but their numbers were too small for comparison by profession. Our sample reflects the national data on the gender of APNs, in that most participants were women (99%). We used the year of graduation from an APN program rather than the year of birth in our correlations as a better marker of recent education (Table 2).

Overall, APNs are incorporating the new guidelines at high rates. However, we found that some guidelines were more quickly incorporated into practice. Delaying the age for initiating screening was 81.5% in 2012 and 88% in 2015. In 2012, in the 21–30-year age group, 15% of NPs were screening every 3 years, whereas by 2015, 72% were screening every 3 years. This is a strong upward trend in only 3 years. However, 25% of APNs continue to perform Pap smears with an annual or every 2-year interval. Of concern is that in 2015, 2.35% of NPs were recommending 5-year intervals in women aged 21–30 years, which is not part of current guidelines.

With screening women older than 30 years, in 2008, over half of APNs were screening at intervals not represented by the guidelines, an indication of much confusion over the changes. By 2012, over half (55%) had moved to every 3-year screening and by 2015, 55% had moved to every 5-year screening. Very few APNs continued to screen annually in 2015 (2.34%), with 94% of respondents screening every 3–5 years. In 2012, the guidelines stated that every 5 years is an accepted interval, and in 2015, only half of APNs were incorporating this guideline into practice. In 2015, there continued to be a lag of integrating routine HPV cotesting to cytology screening in the 30–64-year age group (82.1% of APNs). Most APNs were discontinuing cervical cancer screening by ages 65–70 years in low-risk women. In 2015, 75% of respondents discontinued screening at the age of 65 years, whereas 14% waited until the age of 70 years.

We correlated the year of graduation for APNs and their integration of the guidelines. We hypothesized that more recent graduates would have incorporated the newer guidelines at a higher rate than APNs who had to change their practice. However, this hypothesis held true in one area only. In 2015, recent graduates (2010+) were more likely to initiate screening at the age of 21 years (97.87%) compared with other years of graduation from 1971 to 2009 (ranging form 75 to 93.75%). There was no statistically significant difference between the APNs' year of graduation and the integration of guidelines for screening women aged 21–30 years, women older than 30 years, or for discontinuing screening in older women. In general, APNs of all experience levels were aware of the new guidelines and were incorporating them into practice Table 3.

We also correlated APN practice specialty with uptake of the guidelines. We hypothesized that women's health APNs would have a greater knowledge of the changing guidelines and thus integrate the new guidelines at a higher rate. This hypothesis did not hold true across the board. In 2012, Women's Health NP (WHNP)/CNMs were more likely to delay screening until the age of 21 years (93%) compared with APNs in family practice (88.33%) or internal medicine (70.83%). In 2015, however, APNs in family practice (98.8%) were more likely than APNs in women's health (93.55%) or internal medicine (87.5%) to delay until the age of 21 years, although the uptake was high for all specialties. Advanced practice nurses practicing in internal medicine were slightly more likely to discontinue screening at the age of 65 years (60%) compared with WHNP (57.14%) or family NPs (50.82%). Incorporating the 2006 guideline of every 3-year screening recommendation for adult women was easier than the 2012 guideline of every 5-year screening Table 4.

In 2012, APNs had quickly adopted the guideline to discontinue routine screening for women after total

Table 3. Results of key guideline changes

	2008	2012	2015[a]
Question 2: At what age are you initiating cervical cancer screening?			
Age 21 years	Not asked, as this recommendation was not part of guidelines in 2006.	81.5%	88.36%
Question 3: How often are you screening women aged 21–29 years?			
Annually	—	43.33%	14.71%
2 years	—	34.17%	10.59%
3 years	—	15%	72.35%
5 years	—	0	2.35%[b]
Other	—	7.50%	0%
Question 4: How often are you screening women after the age of 30 years?			
Annually	12.82%	7.5%	2.34%
2 years	23.08%	10.83%	3.51%
3 years	12.82%	55%	42.11%
5 years	0%	5.83%	52.05%
Other	51.28%	20.83%	0%
Question 5: Are you performing routine HPV screening in addition to Pap smears in women aged 30–64 years?			
Yes	60%	66%	82.12%
No	40%	28.81%	17.88%
Other	0%	12.71%	0%
Question 6: When do you discontinue screening?			
Age 65 years	—	50%	75.44%
Age 70 years	—	38.14%	2.34%
Do not recommend discontinuing screening	—	3.39%	2.34%
Other	—	4.24%[c]	8.19%[c]
Question 7: At what interval would you screen a healthy patient who had total hysterectomy for fibroids a year ago?			
Every 3 years	—	11.40%	5.29%
Every 5 years	—	8.77%	8.82%
Would not screen	—	77.65%	77.65%
Unsure	—		8.24%

Note: HPV = human papillomavirus, NP = nurse practitioner.
[a]In 2015, newer graduates (2010+, 97.8%) were more likely to initiate screening at the age of 21 years than NPs graduating 1991–2000, 87.5%.
[b]The guidelines do not recommend every 5 years in the 21–29-year age group.
[c]Comments in the other category included advanced practice nurses not seeing women in this age group or doing some other variation in the age range of 65–70 years.

hysterectomy was performed for benign reasons; this change did not differ by practice site. Correlations by practice specialty were not statistically significant in 2012. However in 2015, WHNP/CNM (90%) would not perform a vaginal Pap smear, whereas APNs in a family setting (78.31%) and internal medicine settings (74.19%) were more likely to do so. The year of graduation did not make a statistically significant difference.

By 2015, few NPs cited a lack of knowledge about the guidelines as a barrier to integrating the guidelines into

Table 4. Barriers to incorporation of guidelines

	2008	2012	2015
Question 8 (a) asked in 2008 and 2012: If not performing screening every 3 years, what are the reasons for why not?			
Question 8 (b) asked in 2015: If not performing screening every 5 years, what are the reasons?			
Unaware of guidelines	23.53%	5.88%	2.70%
Cost and insurance barriers	35.29%	21.57%	5.41%
Not seeing patients in this age group	17.65%	3.92%	8.11%
Practice standards in my office	0%	17.65%	35.41%
Patient had a new sexual partner	0%	11.76%	10.81%
Other (combination of reasons)	23.53%	27.45%	21.62%
Question 9: Estimate how many women in your practice are uncomfortable with the screening interval changes			
<25%	65.79%	69.03%	69.05%
25–50%	26.32%	22.12%	20.24%
51–75%	5.26%	7.08%	7.74%
>75%	2.63%	1.77%	2.98%

practice. Cost and insurance barriers have decreased significantly, presumably related to an increase of insurance coverage under the Affordable Care Act. The emerging barriers were as follows: 1) practice standards in office (33.77% in 2015) with NPs working in internal medicine most likely to report practice standards as a barrier to extending the screening interval in women aged 30–65 years with HPV cotesting to every 5 years, 2) 21.6% indicated a combination of the five reasons, and 3) a lingering belief that a new sexual partner is a risk factor that moves the woman out of the routine screening guidelines to more frequent screening (10.81% of all APNs in 2015). We did not ask about screening with HPV DNA testing only. Although the FDA approved a HPV DNA test for primary screening in women 25 years and older in 2014, women's health organizations and the ACS, ASCCP, and ACOG have not yet endorsed the test for primary screening.

Overall, APNs felt that their patients are increasingly understanding of and comfortable with the guidelines. According to Question 8, women patients quickly embraced the changes in screening guidelines ranging from 65.79% (2008) to 69.04% (2012), but then the response leveled off (69.05%, 2015). We are not able to answer the question of why this occurred from our data Table 5.

As cervical cancer guidelines changed, we heard many APNs questioning the appropriate components of the physical examination with adolescents. We added the following case study in 2012 and 2015. We asked how often APNs performed breast or pelvic examinations as a requirement for initial oral or other types of hormonal contraception with adolescents as a marker for how often NPs are performing these examinations. In 2012, approximately 42% of NPs were performing breast examinations, and 19% were performing pelvic examinations as

Table 5. Screening breast and pelvic examinations in adolescents

Case Study: A Healthy 17-Year-Old Requests Oral Contraceptives				
		By Specialty		
	No Examination	Family	Women's Health	Internal Medicine
Question 10: Would you perform a screening breast examination before prescribing oral contraceptives?				
2012	57.98%	63.93%	64.29%	50%
2015	75%	83.33%	80%	65.63%
Question 11: Would you perform a screening pelvic examination before prescribing oral contraceptives?				
2012	81.20%	63.93%	64.29%	50%
2015	93.06%	96.43%	96.67%	87.50%

a requirement for initiating a hormonal contraceptive. In 2015, the numbers decreased to 25% and 7%, respectively. When we analyzed by practice setting, APNs working in women's health and family practice were less likely to perform a breast or pelvic examination compared with NPs working in internal medicine. We have no data for 2008 because the concept of less physical examination was not a common topic of discussion.

Discussion

Compared with our results, two studies found higher rates of adherence to the guidelines. Both quality improvement interventions focused solely on the adolescent and college age population. A college health center serving 30,000 students showed improved adherence rates (73.95–90.2%) via chart reviews after an educational intervention (Schwaiger, Aruda, LaCoursiere, Lynch, & Rubin, 2013). The provider team included nine NPs, 13 physicians, and two physician assistants (PAs). After conducting a statewide survey showing that 60% of APN providers were performing cervical cancer screening on adolescents, Choma and McKeever (2015) developed a web-based educational intervention. A follow-up survey at 3 weeks showed an 84.6% increase in knowledge and self-reported increase of adherence to guidelines or validation of their clinical practice. Seventy-eight APNs completed the education and 48 completed the survey at 3 weeks (Choma & McKeever, 2015).

The following studies showed lower rates of adherence than seen in our study. A 2013 study of Indiana providers in women's health (14 NPs of 218 respondents) used a vignette-based survey to study adherence patterns with a response rate of 51% (King, Kasper, Daggy, & Tucker, 2014). The study found the highest rate of adherence to delaying screening to 21 years of age (86%) and to discontinuing screening after a benign hysterectomy (75%) or at the age of 65 years (51%). Only 1/3 of respondents were screening women every 3 years from ages 21 to 30 years and every 5 years for ages 30 to 65 years. A Michigan study asked providers at what age they typically initiated cervical cancer screening (Darwish-Yassine et al., 2015). Sixty-four percent of WHNPs (175/273) and 61% of CNMs (253/412) reported that they initiated cervical cancer screening at the age of 21 years compared with 63% of Obstetricians and Gynecologists (OB/GYNs) (378/596) and 36% (109/302) of family practice providers. Providers were asked whether they had completed a continuing education course on cervical cancer screening in the previous 3 years. Approximately 75% (206/273) of the WHNPs reported attending a continuing education course in the previous 3 years followed by 63.0% of CNMs, 59.0% of OB/GYNs, and 40.0% of family practice providers. The most common method of taking a course was attendance at professional meetings or conferences.

In our study, 82% of respondents were performing regular HPV cotesting in women aged 30–64 years compared with 78% of respondents in the study conducted by Haas et al. (2016) compared with 88.8% (CNMs) and 89.7% (NPs) in the study conducted by Darwish-Yassine et al. (2015). However, 33.7% of the CNMs ordered HPV cotesting in most or all women younger than 30 years, whereas approximately one quarter of the NP/CNMs incorrectly ordered HPV to screen for or predict genital warts in this age group.

We sought to understand the barriers of APNs' adherence to the guidelines. Both lack of knowledge (>3%) and cost/insurance barriers (>6%) declined significantly by 2015. The introduction of a new sexual partner continued to increase inappropriate screening in 10% of respondents. The major barrier in 2015 was practice standards (35%). A study by Haas et al. (2016) surveyed 385 providers in the northeast (12% included APNs or PAs) and found that 21% of respondents noted health system measurement of a provider's screening practices that use different criteria as a barrier to adherence to the guidelines. A study conducted in California sought to understand the barriers with a survey to 4,909 providers (369 APNs) with a 25.8% response rate (Boone, Lewis, & Karp, 2016). Only 15% recommended screening intervals in the four different age groups consistent with current guidelines, a much lower rate than in our study. Commentary to their survey questions suggested confusion about guidelines with respect to the impact of smoking status, a new sexual partner, or of a previous abnormal Pap smear. Other respondents expressed concerns about a negative effect on pay for performance, the difficulty of explaining the need for a continued annual visit/examination, or the incorrect assumption of a need to screen before prescribing hormonal contraception. One study identified concerns for lack of follow-up (62.7%) and concerns for false negatives (18.2%) as most frequently cited barriers.

Advanced practice nurses in our study felt that approximately 70% of their patients accepted the changing guidelines.

An online national survey of 376 women in the United States aged 21–65 years in 2014 found that more than 2/3 of women were willing to accept the new guidelines if recommended by their provider (Gerend, Shepherd, Kaltz, Davis, & Shepherd, 2017). Of note is that women seen in an obstetrical/gynecology practice by either an NP or physician were less willing to extend the screening interval; the authors noted that further research is needed to explain this phenomenon. We found high rates of acceptance of the guidelines in all APN specialties, including women's health.

Because guidelines were adopted into practice, APNs questioned other aspects of care as well. In our final study in 2015, we examined changes to the well woman physical examination including screening breast examinations and pelvic examinations in the adolescent population. On average, 93% of APNs in our 2015 survey discontinued screening pelvic examinations, and 75% no longer performed screening breast examinations in the adolescent population as a requirement before ordering a hormonal contraceptive method. A literature review about the value of screening pelvic examinations focused on the practice of performing a screening pelvic examination to initiating hormonal contraceptives as a marker of the usefulness of the examination and found little evidence to support the practice (Tepper, Curtis, Steenland, & Marchbanks, 2013). As early as 1990s, the Federal Drug Administration (FDA), World Health Organization (WHO), International Planned Parenthood Federation (IPPF), and ACOG issued statements that a pelvic examination was not necessary before the initiation of hormonal contraception (Stewart, Harper, Ellertson, Grimes, Sawaya, & Trussell, 2001). Some professional organizations specifically mentioned breast examinations (IPPF), some only mentioned pelvic examinations (ACOG and WHO), whereas the FDA used the term "physical examination" (Stewart et al., 2001) In 2003, the ACOG recommended annual pelvic examinations, regardless of the frequency of cervical cancer screening (ACOG, 2003). In 2012, the ACOG's recommendation included an annual screening pelvic examination beginning at the age of 21 years and reaffirmed this recommendation in 2016, noting that the recommendation is based on expert opinion and not on evidence (ACOG, 2012). These recommendations have not received widespread discussion in professional or public venues as with the cervical cancer screening guidelines until the American College of Physicians and the USPSTF (in draft form) recently expanded their recommendation against the screening pelvic examination to include adult women and adolescents (Qaseem, Humphrey, Harris, Starkey, & Denberg, 2014; USPSTF, 2016a, 2016b). A systematic review of the evidence of performing or not performing a clinical breast examination found no evidence to review because the incidence of breast cancer is so low in this group and the value of clinical breast examination among women of reproductive age is uncertain. In terms of professional organization recommendations, the ACOG Committee on Adolescent Health Care recommends performing clinical breast examinations every 1–3 years beginning at the age of 20 years (ACOG, 2015). The ACS website (ACS, 2017) states that a regular clinical breast examination and self-breast examination are not recommended for any age woman because of the lack of evidence as to the benefit. USPSTF (2016a) did not include clinical breast examination for any age in its most recent breast cancer screening recommendation summary. The recommendations of Centers for Disease Control and Prevention and the U.S. Office of Population Affairs for family planning services state that "unnecessary medical procedures and tests might create logistical, emotional, or economic barriers to contraceptive access for some women, particularly adolescents and low-income women, who have high rates of unintended pregnancies" and do not recommend routine clinical breast examinations or pelvic examinations unless inserting an intrauterine device or fitting a diaphragm (Gavin et al., 2014, p. 11).

Limitations

This is a convenience sample reflective of APN practice in only one geographic region of the country, and thus, the generalizability of the results must be considered. If we had anticipated practice standards as a barrier to adherence, we would have asked more specific questions to gain further insights into this phenomenon. Another limitation was the difficulty in calculating a response rate because of the variety of mechanisms for recruitment.

Conclusion

Our data show higher rates of adherence to the guidelines in all four age groups compared with other studies. Advanced practice nurses found it easier to incorporate guidelines to delay screening until the age of 21 years, to discontinue screening after total hysterectomy for benign reasons, and to discontinue screening at the age of 65 years. Extending screening intervals to 5 years in women aged 30–65 years had the lowest rate of adherence. Overall, the uptake of the changing guidelines was high across all practice settings. Only in one category (delaying screening until the age of 21 years) were recent graduates more likely to adhere to the new guidelines. Most APNs (93%) were no longer performing screening pelvic examinations in adolescents, although some (25%) continued to perform screening breast examinations. The data suggest that, in general, APNs engage in continuing education and integration of emerging evidenced-based knowledge into practice. Overall, APNs felt their patients are increasingly understanding of and comfortable with the guidelines. This is likely a reflection of APN emphasis on patient education and careful discussion of the evidence underlying the changing guidelines. Some APNs indicated a willingness to adopt the new consensus guidelines; however, practice standards were barriers to adherence. Advanced practice nurses need to be involved in practice level or organizational level committees to ensure that evidence guides practice decisions. In our

study, APNs across all specialties proved to be early adapters of cervical cancer screening guideline changes.

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Competing interests: *The authors have no conflicts of interest.*

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