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Current Cervical Cancer Screening Knowledge, Awareness, and Practices Among U.S. Affiliated Pacific Island Providers: Opportunities and Challenges

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Abstract

Background. Cervical cancer is a leading cause of cancer mortality in nearly all U.S. Affiliated Pacific Island Jurisdictions (USAPIJ); however, most jurisdictions are financially and geographically limited in their capacity to deliver routine screening.

Methods. We conducted a cross-sectional survey of 72 health care providers from five of the six USAPIJ in 2011 to assess knowledge, beliefs, practices, and perceived barriers regarding routine cervical cancer screening. We compared the responses of providers from jurisdictions that were funded by the Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Program (NBCCEDP) with those that were not funded.

Results. Most providers reported cervical cancer prevention as a priority in their clinical practices (90.3%) and use the Papanicolaou test for screening (86.1%). Many providers reported knowledge of screening guidelines (76.4%); however, more than half reported that annual screening is most effective (56.9%). Providers in non-NBCCEDP-funded jurisdictions reported greater acceptance of visual inspection with acetic acid (93.9%) and self-sampling for human papillomavirus testing (48.5%) compared with NBCCEDP-funded jurisdictions (15.4% and 30.8% respectively). Providers from non-NBCCEDP-funded jurisdictions reported inadequate technological resources for screening women (42.4%), and approximately 25% of providers in both groups believed that screening was cost-prohibitive.

Conclusion. Although cervical cancer screening is a priority in clinical practice, beliefs about annual screening, costs associated with screening, and varying levels of support for alternative screening tests pose barriers to providers throughout the USAPIJ. Further exploration of using evidence-based, lower cost, and sustainable screening technologies is warranted in addition to emphasizing timely follow-up of all positive cases. ***The Oncologist*** 2014;19:383–393

Implications for Practice: The U.S. Affiliated Pacific Island Jurisdictions (USAPIJ) are located in a geographically disparate region with a high burden of cervical cancer. Although cervical cancer screening providers in the USAPIJ stated that screening is a priority in clinical practice, costs associated with screening and varying levels of support for alternative screening tests pose barriers to screening throughout the USAPIJ. Use of alternative screening tests and routine monitoring and quality assurance to ensure all eligible women are reached may be needed to reduce the cervical cancer burden in the USAPIJ and to ensure effective use of limited resources.

Introduction

Cytology-based screening with the Papanicolaou (Pap) test has substantially reduced cervical cancer mortality in the U.S. and other developed countries; however, that has not been the case in low- and middle-income countries (LMICs), where death rates from this disease have increased or remained unchanged [1]. Effective cytology-based screening requires considerable infrastructure and coordination within the health care system to ensure that women receive screening as well as diagnosis and treatment services if necessary. This infrastructure is absent in many resource-constrained settings, including some of those in the U.S. Affiliated Pacific Island Jurisdictions (USAPIJ) [2, 3].

Cervical cancer is one of the leading causes of cancer death in women in the USAPIJ. Although cervical cancer screening programs exist in the USAPIJ, some islands have limited access to infrastructure necessary to provide care to women with abnormal Pap test results [3], resulting in presentation of advanced stage cervical cancer and substantial morbidity after treatment.

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Some cervical cancer screening programs in the USAPIJ generally follow guidelines from the U.S. Preventive Services Task Force, the American Cancer Society (ACS), the American College of Obstetricians and Gynecologists (ACOG), and the American Society for Colposcopy and Cervical Pathology [4–6]. U.S. screening guidelines have evolved considerably over the past decade to include longer screening intervals for cytology-based approaches, a later age for young women to initiate screening, use of the human papillomavirus (HPV) cotest for women aged 30 years and older that extends screening to 5-year intervals, and a recommendation to cease screening in women with a history of normal test results at age 65 [4–7]. In addition, guidelines for management of young women with abnormal cytology results have become more conservative because most HPV infections resolve spontaneously without long-term adverse effects, and overtreatment of precancerous lesions may lead to adverse reproductive outcomes [8, 9].

In 2013, the World Health Organization (WHO) recommended, at minimum, screening women at least once in their lifetime, between 30 and 49 years of age [10]. Other cervical cancer screening programs in USAPIJ, such as the Federated States of Micronesia (FSM) and the Republic of the Marshall Islands (RMI), have created their own national standards for cervical cancer screening that support the use of visual inspection with acetic acid (VIA), which were developed in 2009 and 2010, respectively [11, 12]. Demonstration projects and randomized controlled screening trials in LMICs have found that the effectiveness and efficiency of a single visit screen-and-treat strategy using VIA or HPV testing followed by treatment with cryotherapy is high [13–18].

The Cancer Council of the Pacific Islands (CCPI), the indigenous body that advises the Pacific Regional Comprehensive Cancer Control Program and other cancer-related initiatives in the USAPIJ, has had a long-term goal of working with the ministries and departments of health in the USAPIJ to develop minimum regional guidelines for cervical cancer screening and prevention [19, 20]. A comprehensive description of the current cervical cancer screening practices in the USAPIJ was needed to inform health departments and local partners on ways to improve existing cervical cancer prevention strategies and to develop new ones. In 2009, the Pacific Island Health Officers Association, an organization that represents the collective health interests of the USAPIJ, stated its support for a project to assess cervical cancer screening practices in the USAPIJ. The purpose of this study was to assess providers' cervical cancer-related knowledge, screening and referral practices, awareness of new or alternative screening technologies, and perceptions of barriers to care. The most senior-ranking health official (minister, secretary, or director of health) in each country endorsed the project and encouraged full support in April 2011. Providers were surveyed as part of a larger program evaluation study that included separate assessment of program staff and community members to study awareness, support, and barriers to cervical cancer screening and HPV vaccination.

Materials and Methods

USAPIJ

The USAPIJ includes American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), Guam, the FSM, the Republic of Palau, and the RMI (Fig. 1) [3]. The USAPIJ is part of a geographically, culturally, politically, and economically diverse region, with considerable variations in public health infrastructure and approaches to cervical cancer prevention (supplemental online Table 1). All jurisdictions of the USAPIJ have cervical cancer screening services available, but jurisdictional cancer programs to support screening vary with respect to organization and resources. The screening programs in American Samoa, Guam, the CNMI, and Palau are funded by the Centers for Disease Control and Prevention's National Breast and Cervical Cancer Early Detection Program (NBCCEDP; http://www.cdc.gov/cancer/nbccedp/). These programs rely solely on cytology-based screening tests (either conventional or liquid based) to conduct cervical cancer screening and have not yet incorporated HPV cotesting into their screening protocols. The RMI and the FSM do not receive NBCCEDP funding. Both jurisdictions developed guidelines that outline a tiered approach (core, expanded, desirable) to screening based on availability of resources. Briefly, RMI's core resource level standard includes screening with VIA women aged 21–50 years at 2-year intervals with referral for Pap test if precancerous lesions are detected. The Pap test is also recommended for screening women aged 50–60 years, as resources permit. FSM's core standard includes screening with VIA women aged 25–45 years at least twice in a lifetime with referral for Pap test if precancerous lesions are detected. Core standards also include opportunistic screening with Pap test, as resources permit. In both jurisdictions, expanded standards include treating precancerous lesions using cryotherapy rather than Pap test follow-up. If resources were available, desirable standards in both jurisdictions include expanding routine screening up to age 60, shortening screening intervals, and using the Pap test and HPV DNA testing. The U.S. Department of Health and Human Services Office of Population Affairs Title X Family Planning Program also funds cytology-based screening in the USAPIJ (http://www.hhs.gov/opa/title-x-family-planning/).

Study Participants and Data Collection

The University of Hawaii administered the survey using jurisdictional health department staff to distribute the survey to all cervical cancer screening providers (physicians, nurse practitioners, public health nurses) participating in the NBCCEDP program, the Title X Family Planning program, and providers on outer islands and in private clinics, using various formats (e.g., mail, in person, phone). For larger jurisdictions (e.g., Guam) with more than 20 providers, staff was instructed to survey 20% of physicians as a convenience sample. The final convenience sample was an estimated 48.3% of all USAPIJ providers.

Survey Instrument

A cross-sectional survey tool was developed in collaboration with the University of Hawaii, the CCPI, and their partners that focused on knowledge, awareness, practices, and barriers to providing routine screening and vaccination. Most questions were selected and adapted from existing U.S. or international program assessment tools, such as tools used by PATH (http://www.path.org/about/index.php). The survey included definitions of various cervical cancer screening tests, including the rapid HPV test (referred to as the "point-of-care HPV test") (*care*HPV; Qiagen, Gaithersburg, MD, http://www.qiagen.com) and the HPV DNA test, which is currently available for use in the

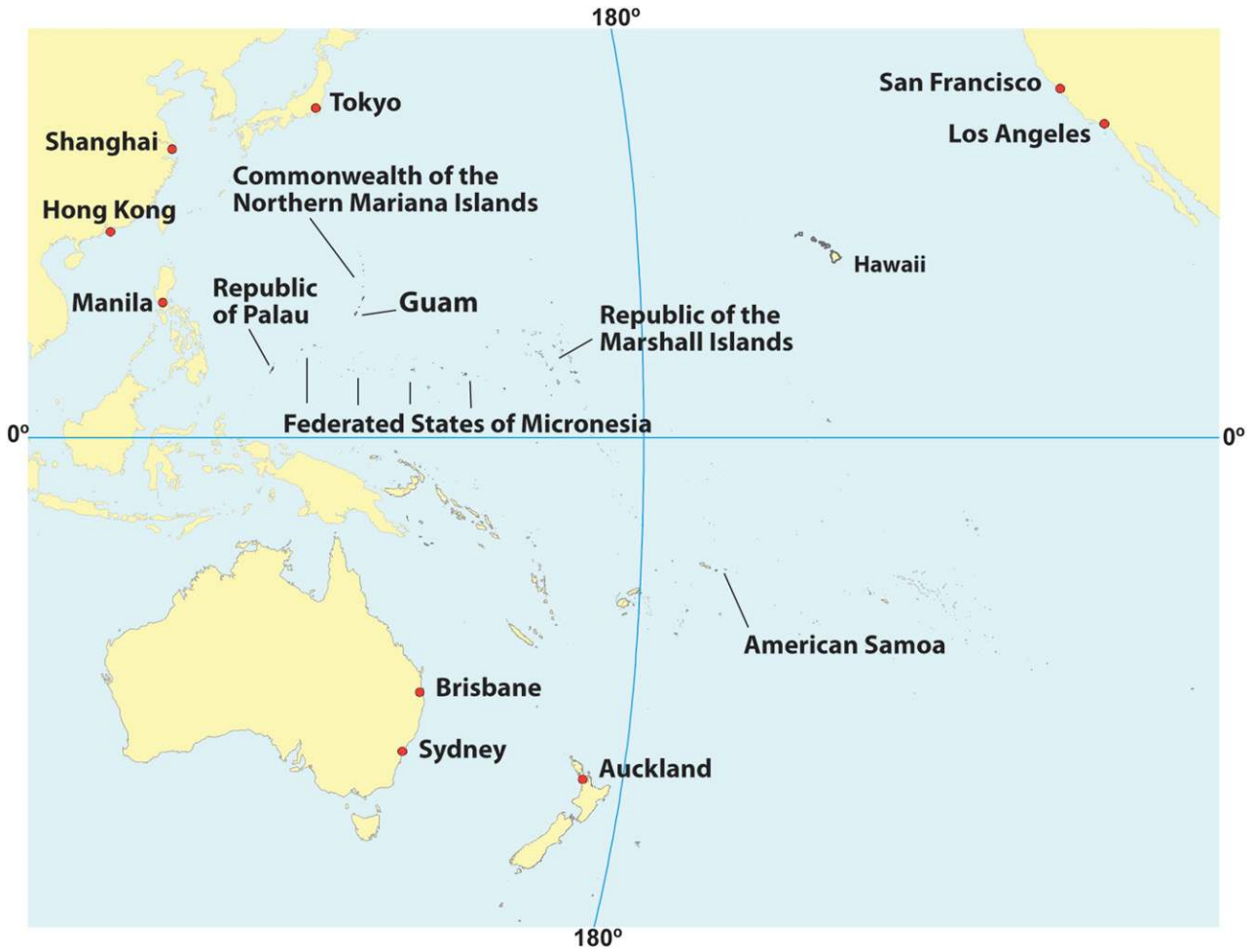

Figure 1. The U.S. Affiliated Pacific Island Jurisdictions.

U.S. (*digene* hybrid capture 2 [HC2]; Qiagen) but is rarely used in the USAPIJ. Members of the CCPI reviewed the survey and offered advice on restructuring and tailoring of survey questions.

The provider survey included questions to assess knowledge and awareness of cervical cancer prevention in general, guidelines for cervical cancer screening, and alternative screening technologies. Response options included "true," "false," and "don't know/not sure." A set of questions assessed barriers to screening such as cost and infrastructure, and providers were asked to answer "agree," "disagree," or "don't know/not sure." Multiple-choice questions were used to assess current screening practices, guidelines followed, and referral practices for women with abnormal test results. The survey included open-ended and multiple-choice questions on the use of VIA and knowledge, attitudes, and practice of other screening technologies. Demographic information on the providers and their patient populations were also collected.

The University of Hawaii Committee on Human Subjects determined that this survey was exempt from review in March 2011.

Data Management and Analysis

Completed surveys were sent to the University of Hawaii for entry into a secure Access database. Although personal identifiers were included on these surveys, these were not entered into the Access database. Original surveys were stored on a secure network with restricted access and paper copies were stored in a locked filing cabinet. Deidentified data were analyzed by the Centers for Disease Control and Prevention.

Descriptive statistics were calculated for each survey item analyzed. Survey items were analyzed by funding jurisdictions, grouped as either NBCCEDP-funded or non-NBCCEDP-funded, and differences were assessed using Fisher's exact test because of the small sample sizes for some survey items. Some NBCCEDP-funded jurisdictions included providers who were not affiliated with the NBCCEDP. Values of $p < .05$ were considered statistically significant.

"No" or "not sure" responses were included in the denominator in calculating percentages, and the "not applicable" category was excluded. All analyses were conducted using SAS version 9.3 (SAS Institute, Inc., Cary, NC, http://www.sas.com).

Results

Participants' Professional and Demographic Characteristics

A total of 72 providers from five of the six jurisdictions (excluding American Samoa) completed the survey. Thirty-nine providers were from NBCCEDP-funded jurisdictions, whereas the remaining 33 were from non-NBCCEDP-funded jurisdictions (Table 1). More than 40% of providers were physicians, followed by registered nurses (20.8%) and licensed practical

Table 1. Cervical cancer screening providers by U.S. Affiliated Pacific Island Jurisdictions

	Total (N = 72)	
Jurisdiction and island	***n***	**%**
NBCCEDP-funded jurisdictions	39	54.2
Commonwealth of the Northern Mariana Islands	13	18.1
Rota	4	5.6
Saipan	7	9.7
Tinian	2	2.8
Guam	20	27.8
Republic of Palau (Koror)	6	8.3
Non-NBCCEDP-funded jurisdictions	33	45.8
Federated States of Micronesia	23	31.9
Chuuk	1	1.4
Kosrae	6	8.3
Pohnpei	12	16.7
Yap	4	5.6
Republic of the Marshall Islands	10	13.9
Ebeye	8	11.1
Majuro	2	2.8

Abbreviation: NBCCEDP, National Breast and Cervical Cancer Early Detection Program.

nurses (16.7%; Table 2). Nearly 35% of providers practiced in general practice, family medicine, or internal medicine settings, and 29% practiced in obstetrics and gynecology.

Knowledge and Beliefs Regarding Screening Tests

Nearly all providers believed that cervical cancer prevention was a health priority in their practices (90.3%; Table 3), and the Pap test was their preferred method for screening (90.3%). Most also believed that women in their community were aware of the need for cervical cancer screening (77.8%). Nearly 64% of providers believed that HPV cotesting (i.e., testing conducted at the same time that a cytology specimen is collected) is more accurate than the Pap test alone.

Awareness of Alternative Screening Technologies

Only 34.7% of providers were aware of the HPV self-sampling test for cervical cancer screening, and 31.9% answered that they would be comfortable providing patients with the self-sampled HPV test. More than 30% of providers felt that the point-of-care HPV test would be a better screening test for their specific jurisdictions than the conventional HPV test, if the point-of-care HPV test were to become available in the USAPIJ. This view was held by more providers in non-NBCCEDP-funded jurisdictions than providers in NBCCEDP-funded jurisdictions (48.5% vs. 15.4%, respectively; $p = .0064$).

Overall, 68.1% of providers were aware of VIA for cervical cancer screening, and 51.4% of providers reported that VIA is an acceptable method of screening patients. Among providers in NBCCEDP-funded jurisdictions, 43.6% reported awareness of VIA, whereas 97.0% of providers in non-NBCCEDP-funded jurisdictions were aware of this method ($p < .0001$). Only 15.4% of providers in NBCCEDP-funded jurisdictions believed that VIA is an acceptable method compared with 93.9% of providers in non-NBCCEDP-funded jurisdictions ($p < .0001$).

Knowledge of Guidelines and Current Practices

Overall, 76.4% of providers were aware of cervical cancer screening guidelines used or adopted in their specific jurisdictions. Nearly 20% of providers believed that cervical cancer screening should begin before sexual initiation. Although 68.1% of providers agreed that cervical cancer screening can be done every 3 years, 56.9% answered that cervical cancer screening must be done annually to be most effective.

Providers' Own Practices

Eighty-six percent of providers used the Pap test to screen patients for cervical cancer (Table 4). Nearly two-thirds conduct annual screening of their patients, whereas 25.8% screen every 3 years. More than 45% of providers in non-NBCCEDP-funded jurisdictions used VIA. One-third of providers screen patients annually with VIA, and 26.7% screen patients every 5 years. Thirteen percent reported not using a routine interval.

Guidelines for screening from ACOG (38.9%), ACS (33.3%), and WHO (27.8%) were the most commonly followed screening guidelines. Providers in NBCCEDP-funded jurisdictions relied more on ACS guidelines (46.2%; $p = .0388$), whereas providers in non-NBCCEDP-funded jurisdictions more frequently reported using WHO guidelines (48.5%; $p < .001$), the FSM national guidelines (33.3%; $p < .0001$), and the RMI national guidelines (24.2%; $p = .0021$). Nearly a quarter of providers reported beginning to screen women for cervical cancer at age 18, and 20.8% continue to screen women until age 70.

ACOG management guidelines were most frequently reported (44.4%), followed by WHO guidelines (25%) and American Society for Colposcopy and Cervical Pathology guidelines (19.4%). Similar to screening guidelines, the sources of management guidelines used varied by NBCCEDP funding status of jurisdictions, with providers in non-NBCCEDP-funded jurisdictions more frequently reporting use of WHO guidelines, the FSM national guidelines, and the RMI national guidelines.

Although 54.2% of providers would reschedule a Pap test for 6–12 months in women younger than 21 years of age with an atypical squamous cells of undetermined significance (ASC-US) test result, some would refer women for reflex HPV testing (i.e., as a follow-up to abnormal cytology results; 12.5%) or colposcopy (8.3%).

Approximately one-quarter of providers reported that screening women for cervical cancer is cost prohibitive and that the cost of cervical cancer screening was a barrier to care both for patients and for the provider to provide regular care to patients (Table 5). Nineteen percent of providers reported that their clinics did not have the technology to adequately screen patients. Providers in non-NBCCEDP-funded jurisdictions had greater awareness of the differences in cost among screening tests than providers in NBCCEDP-funded jurisdictions (69.7% vs. 33.3%; $p = .0103$). A higher proportion of providers in non-NBCCEDP-funded jurisdictions reported that they did not have the technological resources to adequately screen patients (42.4% vs. 0.0%; $p < .0001$) compared with providers in NBCCEDP-funded jurisdictions. Providers in non-NBCCEDP-funded jurisdictions expressed a greater interest in other methods of cervical cancer screening than what they currently used compared with their counterparts in NBCCEDP-funded jurisdictions (69.7% vs. 25.6%; $p < .001$). Both types of providers frequently mentioned the HPV test (48.5%), with either

Table 2. Demographic and practice characteristics of cervical cancer screening providers in the U.S. Affiliated Pacific Island Jurisdictions by type of jurisdiction

	NBCCEDP-funded jurisdictions (N = 39)		Non-NBCCEDP-funded jurisdictions (N = 33)		Total (N = 72)	
Characteristic	***n***	**%**	***n***	**%**	***n***	**%**
Type of health care provider						
Health assistant	2	5.1	1	3.0	3	4.2
LPN/practical nurse	3	7.7	9	27.3	12	16.7
Midwife	3	7.7	2	6.1	5	6.9
Nurse practitioner	2	5.1	1	3.0	3	4.2
Physician	16	41.0	13	39.4	29	40.3
Physician assistant	1	2.6	0	0.0	1	1.4
RN/graduate nurse	9	23.1	6	18.2	15	20.8
Other	2	5.1	0	0.0	2	2.8
Not reported	1	2.6	1	3.0	2	2.8
Areas of health specialty[a]						
Pediatrics	1	2.6	0	0.0	1	1.4
General practice/family medicine/ internal medicine	12	30.8	13	39.4	25	34.7
Obstetrics/gynecology	12	30.8	9	27.3	21	29.2
Other	6	15.4	5	15.2	11	15.3
Multispecialty	4	10.3	2	6.1	6	8.3
Not reported	4	10.3	4	12.1	8	11.1
Years in current position, median	37	6.0	29	9.0	66	8.5
Female patients[b]	29	78.8	21	73.3	50	76.5
Routinely ask whether patients are sexually active[c]	29	74.4	25	75.8	54	75.0
Always	16	55.2	5	20.0	21	38.9
Most of the time	8	27.6	13	52.0	21	38.9
Sometimes	5	17.2	5	20.0	10	18.5
Never	0	0.0	1	4.0	1	1.9

[a]Infrequently reported health specialties were recoded as "other," the majority of which were providers in public health and immunization programs. Providers reporting more than one specialty were categorized as "multispecialty."
[b]Calculated as the average percentage across all providers.
[c]Data shown are for providers who answered "yes" to the question of whether they routinely ask their patients if they are sexually active. Percentages for how often providers ask this question do not total 100% because of missing responses.
Abbreviations: LPN, licensed practical nurse; NBCCEDP, National Breast and Cervical Cancer Early Detection Program; RN, registered nurse.

provider- or self-collected sampling, as a test they would be interested in using to screen patients in the future. Among all providers, 34.7% reported referring patients to another facility for colposcopy, and 56.9% referred patients for cryotherapy.

Discussion

Providers in the USAPIJ were generally well informed about cervical cancer and prevention strategies and stated that cervical cancer prevention was a priority in their practices; however, some gaps exist in their knowledge and practice of evidence-based guidelines for cervical cancer. A minority of providers believed, for example, that screening should begin before young women are sexually active. Some providers continue to screen women annually or outside of recommended age intervals, which is similar to findings among U.S. providers [21–23]. However, cervical cancer screening coverage is generally low in the USAPIJ [24–27]. Few women are screened through the NBCCEDP or the Title X Family Planning Program in relation to the eligible population (supplemental online Table 1). In Guam, 63.5% of women aged 18 years and older in 2012 reported being screened within the past 3 years compared with 78.0% of women residing in U.S. states and the District of Columbia [28]. Many jurisdictions in the USAPIJ have remote outer islands where access to diagnostic and treatment services is limited, and care is provided by dispensaries staffed by health assistants supported by periodic visits by health care teams; therefore, women residing in these areas may be screened rarely [3].

The vast majority of all providers reported using the Pap test, even in jurisdictions where national screening guidelines permit use of VIA [11, 12]. Lack of health care resources in the USAPIJ makes this region similar to other LMICs [29]. VIA for screening followed by cryotherapy to treat precancerous lesions are suitable procedures for LMICs because both are inexpensive and can be performed by nurses [30]. Currently, Title X Family Planning Program funds may not be applied

Table 3. Provider knowledge and beliefs regarding cervical cancer screening in the U.S. Affiliated Pacific Island Jurisdictions by type of jurisdiction

	NBCCEDP-funded jurisdictions (N = 39)		Non-NBCCEDP-funded jurisdictions (N = 33)		Total (N = 72)		
Characteristic[a]	***n***	**%**	***n***	**%**	***n***	**%**	***p***[b]
Beliefs							
Cervical cancer is preventable	37	94.9	32	97.0	69	95.8	1.0000
Cervical cancer prevention is a health priority in my practice	33	84.6	32	97.0	65	90.3	.2762
Women in my community are aware of the need for screening	28	71.8	28	84.9	56	77.8	.4347
The Pap test is the preferred method for screening	37	94.9	28	84.9	65	90.3	.0757
HPV testing preferences and awareness							
HPV and Pap cotesting is more accurate than the Pap test alone	27	69.2	19	57.6	46	63.9	.5512
HPV testing alone with a Pap test follow-up is an accurate method	13	33.3	17	51.5	30	41.7	.2968
Awareness of the HPV self-test (patient self-collected vaginal swab)	12	30.8	13	39.4	25	34.7	.0611
Comfortable with providing patients with the HPV self-test (i.e., self-sampled) to screen	12	30.8	11	33.3	23	31.9	.5180
Women in my practice will find the HPV self-test (i.e., self-sampled) more acceptable	12	30.8	16	48.5	28	38.9	.2691
Rapid (i.e., point of care) HPV test is better for my island than the regular HPV test	6	15.4	16	48.5	22	30.6	.0064
VIA testing preferences and awareness							
Awareness of VIA	17	43.6	32	97.0	49	68.1	<.0001
VIA is an acceptable method for screening my patients	6	15.4	31	93.9	37	51.4	<.0001
Cervical cancer screening preferences and awareness							
Awareness of jurisdiction's cervical cancer screening guidelines	28	71.8	27	81.8	55	76.4	.6225
Screening should be initiated before sexual intercourse	7	18.0	7	21.2	14	19.4	.9302
Screening must be done annually to be most effective	18	46.2	23	69.7	41	56.9	.0837
Screening can be done every 3 years	28	71.8	21	63.6	49	68.1	.2757
Screening cannot prevent 100% of all cervical cancer cases	31	79.5	21	63.6	52	72.2	<.0001
HPV vaccine will affect when screening is started among fully vaccinated patients	13	33.3	19	57.6	32	44.4	.1257

[a]Data shown were for providers who answered "true" to the statement. Other response options included "false" and "don't know/not sure," which included missing responses.
[b]The *p* values were obtained using Fisher's exact test, which compared responses from providers in NBCCEDP-funded and non-NBCCEDP-funded jurisdictions.
Abbreviations: HPV, human papillomavirus; NBCCEDP, National Breast and Cervical Cancer Early Detection Program; Pap test, Papanicolaou test; VIA, visual inspection with acetic acid.

toward VIA screening. Additional training for providers and program staff may also be needed to fully implement guidelines that support the use of VIA in non-NBCCEDP-funded jurisdictions because use of VIA was only 45.5%. Providers in non-NBCCEDP-funded jurisdictions stated greater awareness of VIA and more frequently reported that VIA was an acceptable method of screening their patients. Open-ended survey items on VIA answered by VIA screening providers generally reflected positive statements (data not shown). Awareness of VIA was considerably lower in NBCCEDP-funded jurisdictions, and few believed it was an acceptable screening method. In general, NBCCEDP policies on cervical cancer screening generally follow U.S. Preventive Services Task Force guidelines, which do not address use of VIA [4, 31].

In LMICs, using primary HPV screening rather than cytology presents numerous advantages and is a feasible strategy [32, 33]. Around 46% of providers expressed interest in alternative screening methods, and many cited the HPV test. Using the conventional HPV test currently available in the U.S. as a primary screening test is an alternative, evidence-based screening strategy that could potentially reach more women [34–38]. Only about 42% of providers across the USAPIJ

Table 4. Cervical cancer screening and follow-up practices of providers in the U.S. Affiliated Pacific Island Jurisdictions by type of jurisdiction

	NBCCEDP-funded jurisdictions (N = 39)		Non-NBCCEDP-funded jurisdictions (N = 33)		Total (N = 72)		
Response	***n***	**%**	***n***	**%**	***n***	**%**	***p*[a]**
Screening method							
Pap test	32	82.1	30	90.9	62	86.1	.1601
Frequency[b]							
Annually	21	65.6	20	66.7	41	66.1	1.0000
Every 3 yr	8	25.0	8	26.7	16	25.8	
VIA	NC		15	45.5	NC		NC
Frequency[b]							
Annually			5	33.3			
Every 3 yr			1	6.7			
Every 5 yr			4	26.7			
No routine interval			2	13.3			
Professional screening guidelines used[c]							
ACS	18	46.2	6	18.2	24	33.3	.0388
ACOG	20	51.3	8	24.2	28	38.9	.0511
USPSTF	7	18.0	3	9.1	10	13.9	.6295
AAFP	4	10.3	2	6.1	6	8.3	.8479
WHO	4	10.3	16	48.5	20	27.8	<.001
FSM national guidelines	0	0.0	11	33.3	11	15.3	<.0001
RMI national guidelines	0	0.0	8	24.2	8	11.1	.0021
Screening practices for women who are HPV vaccinated[d]							
No further screening required	1	2.9	2	7.4	3	4.8	.5101
Follow guidelines for unvaccinated population	25	71.4	21	77.8	46	74.2	
Criteria for screening initiation[e]							
Age (yr)							
18	10	25.6	7	21.2	17	23.6	.7830
21	9	23.1	6	18.2	15	20.8	.7725
25	0	0.0	8	24.2	8	11.1	.0012
Based on time since sexual initiation (yr)							
1	10	25.6	7	21.2	17	23.6	.7830
3	9	23.1	12	36.4	21	29.2	.2988
Patient requests to be screened	11	28.2	12	36.4	23	31.9	.6126
Criteria for stopping screening[e]							
Age (yr)							
50	0	0.0	2	6.1	2	2.8	.2066
60	4	10.3	4	12.1	8	11.1	1.0000
65	9	23.1	7	21.2	16	22.2	1.0000
70	7	18.0	8	24.2	15	20.8	.5694
After three normal test results	15	38.5	13	39.4	28	38.9	1.0000
When patient stops coming in	3	7.7	6	18.2	9	12.5	.2847
If patient has a normal test result history	2	5.1	2	6.1	4	5.6	1.0000
Management guidelines used[c]							
ASCCP	10	25.6	4	12.1	14	19.4	.4023
ACOG	21	53.9	11	33.3	32	44.4	.1921
WHO	5	12.8	13	39.4	18	25.0	.0218

(continued)

Table 4. (continued)

Response	NBCCEDP-funded jurisdictions (N = 39)		Non-NBCCEDP-funded jurisdictions (N = 33)		Total (N = 72)		
	n	%	*n*	%	*n*	%	*p*[a]
FSM national guidelines	0	0.0	11	33.3	11	15.3	<.0001
RMI national guidelines	0	0.0	9	27.3	9	12.5	<.001
Follow-up practices for women aged <21 yr with an ASC-US Pap test result[f]							
Reflex HPV test	8	20.5	1	3.0	9	12.5	.0332
Colposcopy	5	12.8	1	3.0	6	8.3	.2088
Reschedule a Pap test for 6–12 mo	20	51.3	19	57.6	39	54.2	.6407
Refer to another clinician	7	18.0	6	18.2	13	18.1	1.0000
Follow-up practices for women aged >21 yr with an ASC-US Pap test result[f]							
Reflex HPV test	14	35.9	0	0.0	14	19.4	<.0001
Colposcopy	3	7.7	7	21.2	10	13.9	.1698
Reschedule a Pap test for 6–12 mo	16	41.0	16	48.5	32	44.4	.6354
Refer to another clinician	9	23.1	8	24.2	17	23.6	1.0000

[a]The *p* values were obtained using Fisher's exact test, which compared responses from providers in NBCCEDP-funded and non-NBCCEDP-funded jurisdictions.
[b]Percentages do not total 100% because some providers did not report the interval used.
[c]Survey respondents could provide multiple responses to the questions on which professional guidelines they follow for cervical cancer screening and cervical cancer management.
[d]Excludes 10 providers who reported "not applicable." Percentages do not total 100% because of missing responses.
[e]Survey respondents provided multiple responses to these questions. In addition, some survey respondents provided a starting age outside of the original response options or stated other criteria for initiating screening based on sexual history. For specific responses that occurred frequently, we created new categories (e.g., age 21).
[f]Some survey respondents provided multiple responses to these questions.
Abbreviations: AAFP, American Academy of Family Physicians; ACOG, American College of Obstetricians and Gynecologists; ACS, American Cancer Society; ASCCP, American Society for Colposcopy and Cervical Pathology; ASC-US, atypical squamous cells of undetermined significance; FSM, Federated States of Micronesia; HPV, human papillomavirus; NBCCEDP, National Breast and Cervical Cancer Early Detection Program; NC, not calculated; Pap test, Papanicolaou test; RMI, Republic of the Marshall Islands; USPSTF, U.S. Preventive Services Task Force; VIA, visual inspection with acetic acid; WHO, World Health Organization.

recognize this as an accurate method. To date, neither the point-of-care HPV test nor the conventional HPV test is approved by the U.S. Food and Drug Administration for primary screening, and the conventional HPV test requires access to a molecular laboratory to process samples. NBCCEDP programs choosing to use reflex HPV testing send their samples to Hawaii for processing, although this may be expensive and cause delays in the time from screening to diagnosis and treatment. Using the HPV test for primary screening may increase the number of referrals for colposcopy [35], and nearly 35% of providers must refer their patients for this procedure. Its lower specificity for detecting transient versus persistent HPV infection may require a separate screening test such as cytology or VIA to triage women with positive results [17, 18, 32, 35–40].

Awareness overall was relatively low for other emerging technologies for screening, such as the self-sampled HPV test and the point-of-care HPV test, given that these tests are not available in the USAPIJ. Providers in non-NBCCEDP-funded jurisdictions were more aware of the point-of-care HPV test than were their counterparts in NBCCEDP-funded jurisdictions. Compared with providers in NBCCEDP-funded jurisdictions, providers in non-NBCCEDP-funded jurisdictions reported more financial and technological barriers to screening, although a sizable minority in both types of jurisdictions reported that screening was cost prohibitive and sometimes a barrier to providing regular care to patients. Many providers refer patients to a hospital or off-island for diagnostic and treatment procedures, including cryotherapy. As more scientific evidence on effectiveness of newer HPV-based methods in LMICs becomes available [2, 33, 41–43], these methods may also become viable screening options in the Pacific Islands. The point-of-care HPV test may be delivered as a self- or provider-administered test, with results available in several hours using laboratory equipment that does not require electricity and highly experienced technicians, making it suitable for low-resource settings [32, 40, 41]. This may be particularly relevant for the USAPIJ, with remote inhabited islands where women may be invited by outreach workers for screening. A woman with a positive HPV result from a point-of-care HPV test could be followed up with VIA performed by either a nurse or a trained health assistant on the same day, and lesions may be treated with cryotherapy immediately afterward. Self-sampling, using either a conventional HPV test or a point-of-care HPV test, is a promising, effective strategy for reaching underserved women in remote settings who have never been screened for cervical cancer and when resources limit screening with a highly sensitive test to only several occasions in a woman's lifetime [33, 42–45].

Women across the USAPIJ represent diverse cultures and beliefs, so cultural acceptability should be considered as new technologies emerge. Acceptability may not be as much of a problem with the advantages of having test results available immediately or within a couple of hours [46]. Women who are uncomfortable with the Pap test or with male providers conducting these examinations may also find alternative technologies more acceptable, such as the self-sampled HPV

Table 5. Perceived barriers to cervical cancer screening and availability of diagnostic and treatment procedures in the U.S. Affiliated Pacific Island Jurisdictions

	NBCCEDP-funded jurisdictions (N = 39)		Non-BCCEDP-funded jurisdictions (N = 33)		Total (N = 72)		
Response	***n***	**%**	***n***	**%**	***n***	**%**	***p*[a]**
Perceived barriers to screening[b]							
Screening women for cervical cancer is cost prohibitive	10	25.6	7	21.2	17	23.6	.7802
I am aware of the difference in costs among each type of screening test	13	33.3	23	69.7	36	50.0	.0103
Cost of cervical cancer screening is a barrier to care for my patients	10	25.6	8	24.2	18	25.0	.9438
Cost of cervical cancer screening is a barrier for me to provide regular care to patients	7	18.0	10	30.3	17	23.6	.1477
This clinic does not have the resources (technology) to adequately screen patients	0	0.0	14	42.4	14	19.4	<.0001
Providers interested in using a different screening method[c]	10	25.6	23	69.7	33	45.8	<.001
HPV test (self-collected, provider administered)	5	50.0	11	47.8	16	48.5	NC
VIA	1	10.0	12	52.2	13	39.4	NC
Availability of diagnostic and treatment procedures							
Cervical colposcopy performed at this clinic[d]							
Yes, I provide colposcopy at my practice	9	23.1	5	15.2	14	19.4	.5700
Yes, another clinician provides colposcopy at my practice	8	20.5	8	24.2	16	22.2	
No, patients are referred to another care facility	14	35.9	11	33.3	25	34.7	
Not sure	1	2.6	4	12.1	5	6.9	
Cervical cryotherapy performed at this clinic[d]							
Yes, I provide cryotherapy at my practice	2	5.1	3	9.1	5	6.9	.5301
Yes, another clinician provides cryotherapy at my practice	5	12.8	3	9.1	8	11.1	
No, patients are referred to another care facility	20	51.3	21	63.6	41	56.9	

[a]The *p* values were obtained using Fisher's exact test, which compared responses from providers in NBCCEDP-funded and non-NBCCEDP-funded jurisdictions.
[b]Data are shown for providers who indicated that they agreed with the statement. Other response options included "disagree" and "don't know/not sure." Missing responses are included with the "don't know/not sure" category.
[c]Data are shown for providers who answered "yes" to the question of whether they were interested in using other cervical cancer screening methods than what they currently use. Providers provided open-ended responses, and responses were hand coded to either the HPV test (self-administered or provider administered) or VIA. Some providers indicated interest in more than one method or did not specify a method. Last, *p* values were not calculated for the type of test.
[d]Percentages do not total 100% because of missing responses.
Abbreviations: HPV, human papillomavirus; NBCCEDP, National Breast and Cervical Cancer Early Detection Program; NC, not calculated; VIA, visual inspection with acetic acid.

test [33, 45, 47, 48]. Although the literature is scarce on USAPIJ women's attitudes and beliefs regarding cervical cancer prevention, studies have shown that women have concerns regarding confidentiality of test results and respect from health care providers [49, 50]. Fear and shame may also prevent some women from seeking screening [49, 51]. Future health promotion activities may need to continue to address these barriers as alternative screening technologies are deployed.

With the exception of Guam, women diagnosed with stage III (and sometimes stage II) or higher cervical cancer must be referred off-island for treatment because on-island surgical options and chemotherapy are not available. A reduction in these costs may be achieved if early detection is addressed as a comprehensive approach. Regular updates and trainings, including those that focus on routine quality assurance and monitoring and coverage of the target population and that address patient and clinical barriers may be developed by public health professionals. Ministries and departments of health may ensure that equitable access to quality cervical cancer screening services exists for all women and that all women with precancerous lesions receive follow-up and entry into treatment services [52]. Continued programmatic activities on routine quality assurance, population-based surveillance, and evaluation may be continued. The development of referral systems for follow-up treatment for screening programs would increase their effectiveness [52].

This study has inherent limitations. First, this survey was cross-sectional; therefore, our findings reflect only one point in time and predate the latest U.S. cervical cancer screening guidelines in 2012. Second, there was no formal pilot testing of the provider survey, although some members of the CCPI who provided direct input to the survey are providers. Third, because our final sample was a convenience sample, our findings may not be generalizable to all screening providers in some jurisdictions, especially those with large proportions of private providers (Guam and the CNMI). Fourth, the providers

who answered the survey may not be aware of the NBCCEDP program and may be providers of other programs (e.g., family planning). Fifth, a variety of health care professionals, including some public health professionals, completed the survey. Some respondents may not have been directly involved in cervical cancer screening. Sixth, nonresponse to sections of the survey was significant; between one-quarter and one-half of providers were unsure or did not provide a response regarding HPV testing preferences and beliefs. Other survey items also had a significant minority of providers not provide an answer. Nonresponse or unsure responses to some survey questions may also indicate a need for further education. Seventh, because our survey data are self-reported, they are subject to social desirability and recall bias and may not truly reflect actual screening practices. Despite these limitations, the current study represents an important contribution to the understanding of cervical cancer screening practices in the USAPIJ because few comprehensive assessments of screening practices have been conducted in those jurisdictions. Findings from this comprehensive assessment will be helpful for informing program planning and training.

Conclusion

Although cervical cancer screening is a priority in clinical practice, costs associated with screening pose barriers to the provision of proper care throughout the USAPIJ. Providers, particularly in non-NBCCEDP-funded jurisdictions, report use of and interest in alternative screening technologies. Two of these jurisdictions have already adapted their own screening guidelines, which are more resource appropriate and have the potential to screen each woman at least twice in her lifetime, including those living on remote islands. These guidelines may further be refined to better reflect 2013 WHO guidelines. Additionally, several USAPIJs are interested in conducting feasibility testing of WHO algorithms utilizing HPV primary screening, followed by VIA and cryotherapy of precancerous lesions. However, providers and health departments and ministries of health interested in adopting these new technologies may need to set policies and standards for screening, diagnosis, and referral, and women in the community will need to be comfortable with different testing methods [10, 33, 46, 47, 52–54]. Quality assurance and program monitoring to ensure that all eligible women are reached and that women with abnormal test results are followed in a timely manner will be key to reducing the cervical cancer burden and ensuring effective use of resources. Efforts are currently under way to develop a joint committee opinion through the American Society for Colposcopy and Cervical Pathology and ACOG on alternative screening technologies for U.S. territories and Pacific Island Jurisdictions [55]. Further exploration of using evidence-based, lower-cost, and more sustainable screening technologies is warranted for all jurisdictions, as is development of guidelines that can be achieved in the USAPIJ, given the region's geographic isolation, limited resources, history, and cultural diversity.

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See http://www.TheOncologist.com for supplemental material available online.