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Recommendations for a national agenda to substantially reduce cervical cancer

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Abstract

Purpose—Prophylactic human papillomavirus (HPV) vaccines and new HPV screening tests, combined with traditional Pap test screening, provide an unprecedented opportunity to greatly reduce cervical cancer in the USA. Despite these advances, thousands of women continue to be diagnosed with and die of this highly preventable disease each year. This paper describes the initiatives and recommendations of national cervical cancer experts toward preventing and possibly eliminating this disease.

Methods—In May 2011, Cervical Cancer-Free America, a national initiative, convened a cervical cancer summit in Washington, DC. Over 120 experts from the public and private sector met to develop a national agenda for reducing cervical cancer morbidity and mortality in the USA.

Results—Summit participants evaluated four broad challenges to reducing cervical cancer: (1) low use of HPV vaccines, (2) low use of cervical cancer screening, (3) screening errors, and (4) lack of continuity of care for women diagnosed with cervical cancer. The summit offered 12 concrete recommendations to guide future national and local efforts toward this goal.

Conclusions—Cervical cancer incidence and mortality can be greatly reduced by better deploying existing methods and systems. The challenge lies in ensuring that the array of available prevention options are accessible and utilized by all age-appropriate women—particularly minority and underserved women who are disproportionately affected by this disease. The consensus was that cervical cancer can be greatly reduced and that prevention efforts can lead the way towards a dramatic reduction in this preventable disease in our country.

Keywords

Cervical cancer prevention; Human papillomavirus; HPV vaccine; HPV test; Pap test

Introduction

Over the last 50 years, cervical cancer incidence and mortality rates have declined significantly in the USA, due largely to widespread use of cytological screening with the Papanicolaou (Pap) test [1]. Despite this, in 2012, an estimated 12,170 women will be diagnosed with invasive cervical cancer and an estimated 4,220 women will die of this highly preventable disease [2]. With the introduction of human papillomavirus (HPV) screening and vaccination, the USA now has an opportunity to greatly reduce cervical cancer [3–5].

In 2010, the Cervical Cancer-Free America (CCFA) initiative was created. CCFA (www.cervicalcancerfreeamerica.org) is a multi-state collaboration to increase vaccination, screening, and access to effective treatment, with a focus on reducing cancer disparities. The idea for a national initiative originated from North Carolina's cervical cancer-free program, which launched earlier the same year. In addition to North Carolina, CCFA's member states now include Alabama, California, Indiana, Kentucky, South Carolina, Tennessee, and Texas, with eight other states expressing interest in joining. The initiative ensures the sharing of successful strategies among collaborative state partners. CCFA's approach uses the "Carolina Framework," developed at UNC, which identifies and addresses four key public health challenges to eradicating cervical cancer (Table 1) [6].

CCFA national summit

In May 2011, CCFA convened a cervical cancer summit in Washington, DC. The summit mobilized the public health community to develop a national agenda for reducing cervical cancer morbidity and mortality in the USA. Experts participated from more than 75 organizations representing federal and state governments, medical organizations, nongovernmental organizations, academia, survivors, advocates, and the private sector. This report provides a brief background on cervical cancer prevention, outlines the meeting's discussions around the delivery of preventive services and treatment, and presents

recommendations developed at the summit for first steps toward reducing cervical cancer in the USA.

Pillars for cervical cancer prevention

Screening and immunization

Over the last half century, the Pap test has become one of the nation's most impactful public health screening tools. In 2003, the Food and Drug Administration (FDA) approved testing for carcinogenic types of HPV infection as an adjunct to the Pap test. This combined approach provides greater sensitivity for detection of high-grade precancerous cervical lesions and cervical cancer than the Pap test alone. Additionally, a negative HPV test result provides assurance of a longer disease-free interval between screenings [7]. The FDA approved HPV testing for use with the Pap test in routine screening of women aged 30 and above only, due to the high rates of HPV infections in younger women that are not associated with high-grade cervical disease. Combined HPV and Pap screening for women ages 30–65 has since been incorporated into the American Society for Colposcopy and Cervical Pathology's (ASCCP), the American Cancer Society's (ACS), the American Society for Clinical Pathology's (ASCP), and the United States Preventive Services Task Force's (USPSTF) cervical cancer screening guidelines [8–10].

In 2006, the FDA approved the first prophylactic HPV vaccine (quadrivalent) for girls and young women aged nine through 26. In 2009, the FDA approved a second prophylactic HPV vaccine (bivalent). Studies show that both vaccines prevent infection with the two types of HPV (16 and 18) that are responsible for more than 70 % of cervical cancers and 50 % of high-grade lesions [11]. The federal Advisory Committee on Immunization Practices (ACIP) recommends universal HPV vaccination for girls aged 11 or 12. Guidelines recommend giving the vaccine as a “catch-up” for females aged 13 through 26 (through age 25 for the bivalent vaccine) [12, 13]. In 2009, the FDA approved the quadrivalent HPV vaccine for use in boys aged nine through 26, and in 2011, the ACIP recommended HPV vaccination for boys ages 11 or 12 and as a “catchup” for males aged 13 through 21 and through age 26 for men who have sex with men [14]. Both vaccines require three doses over a six-month period.

Given the availability and effectiveness of these new immunization and screening tools, the CCFA summit participants agreed that cervical cancer can be greatly reduced and that prevention efforts should now move from a research-focused agenda to one of wide-scale public health implementation and evaluation.

Access to and delivery of healthcare services

Several public programs offer health insurance coverage to girls and women. Medicaid insures 12 % of women in the USA, providing assistance to low-income women aged 18–64 who are pregnant, have children living at home, or have a disability [15]. Medicare, which primarily offers assistance to people aged 65 and older, also covers 3 % of women aged 18–64 who qualify because they have a disability or end-stage renal disease [16]. Medicare provides coverage for Pap tests, but currently does not cover HPV testing as part of routine

screening. Despite these public financing programs, about 20 % of women in the USA between the ages of 18 and 64 remain uninsured because they do not qualify for Medicaid or Medicare and cannot afford private insurance [17].

The federally funded Vaccines for Children (VFC) Program covers immunization services, including HPV vaccination for children aged nine through 18 years who are Medicaid-eligible, American Indian or Alaskan native, uninsured or underinsured [18]. Children under the age of 19 in families with incomes too high to qualify for most state Medicaid programs, but too low to afford private coverage, may be eligible for the federal Children's Health Insurance Program (CHIP) or similar state-based programs [19].

For qualified women in all 50 states and the District of Columbia, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) provides cervical cancer screening—either routinely or based on a doctor's recommendation [20]. States implement the NBCCEDP program using a national framework, although program implementation varies depending upon legislation, funds, and oversight. Coverage for HPV testing for women aged 30 years and above—is offered by some states, but not all except when provider requested [20].

Through the NBCCEDP, an estimated 9.7–11 % of low-income, screening-age women qualify for cervical cancer early detection services [20]. This program provides pelvic examinations, Pap tests, colposcopy, and pathology services for women with abnormal Pap test results, and referral to treatment, which is covered through Medicaid. Since 1991, the NBCCEDP has served more than 4.2 million women. Still, the program reaches only 8.5 % of eligible women annually due largely to limited federal funds to support it. Additionally, in many states other federal resources (e.g., Title X) support free cervical cancer screening [21].

NBCCEDP services for cervical cancer prevention are for women aged 40 or above and symptomatic women under the age of 40 whose care may not be covered under other federal programs. The program thus misses opportunities to screen women aged 21–39 and to follow up those with abnormal Pap test results [20]. Furthermore, NBCCEDP does offer age-appropriate HPV testing to women as part of screening if requested by a provider, even though the Institute of Medicine recently recommended it as a preventive health service that health plans should cover at no cost to patients under the patient protection and Affordable Care Act of 2010 [22]. The United States Preventive Services Task Force recently made a recommendation for HPV testing for screening of women aged 30 years and above, deeming the net benefit as substantial [10]. This should lead to expanded coverage to national federal programs in the future.

Federally Qualified Health Centers (FQHC) are important access points for uninsured and underserved girls and women. FQHC provide primary and preventive care services for medically underserved populations without regard to their ability to pay. These sites offer HPV vaccination to females and males, administer Pap tests to around 1.8 million women every year, and identify about 117,000 abnormal cervical results annually [23]. State and local health departments, as well as local affiliates of nonprofit organizations such as

Planned Parenthood Federation of America, are also major sources of cervical cancer screening and HPV vaccination services for underserved women.

Key challenges to reducing cervical cancer

Despite the availability of comprehensive cervical cancer prevention tools and numerous programs to help women access these preventive services, many women are still diagnosed with and die from cervical cancer, a highly preventable disease. Participants at the CCFA cervical cancer summit identified four primary challenges to decreasing cervical cancer incidence and mortality in the USA, which align closely with those of the Carolina Framework [6].

Low HPV vaccination coverage

HPV vaccination offers protection against the two HPV types of infection (HPV-16 and 18) responsible for more than 70 % of cervical cancers. HPV vaccines are currently underused among adolescent females, with just over half of 13–17-year-old girls having started the three-dose vaccine series. As of 2011, only 35 % of girls in this age range had completed the three-dose series [24].

Healthcare providers offer the vaccine inconsistently and often counter to ACIP recommendations [26]. In a recent study, only 33–50 % of physicians reported always recommending HPV vaccination to adolescent girls. Furthermore, physicians advised HPV vaccination most often for adolescents aged 13–17, despite the ACIP's recommendation to target 11- and 12-year-olds [26].

A lack of a medical home for adolescents, who have few healthcare visits, and no requirement for routine 11- or 12-year-old checkups also may contribute to low vaccination rates. Adolescents must attend multiple visits to receive all three required doses, which may not only be inconvenient, but requires additional co-pays or possible deductible expenses. Furthermore, parents' beliefs and lack of knowledge and misperceptions present barriers to HPV immunization [25]. For example, some parents felt they did not know enough about the vaccine or had not received a clinician's recommendation. Other potential barriers to HPV vaccination include parents' religious beliefs, cost, as well as misinformation among providers and parents regarding HPV vaccine safety and efficacy [27].

In contrast, other countries have successfully achieved high uptake through school-located vaccination programs. For example, Australia's National HPV Vaccination Program provides all 12- or 13-year-old females with HPV immunization within schools, achieving a coverage rate in 2009 of 71 % for all three doses [28]. Similarly, Scotland's uptake rate in school programs was 81 % for all three doses in 2010 [29]. School programs attempted in the USA have encountered barriers, such as reimbursement issues for insurance coverage, low parental consent, and privacy concerns [30, 31].

Lack of screening

At least 50 % of cervical cancer cases are due to lack of screening [32–35]. Although cervical cancer screening is highly effective for reducing cervical cancer mortality, at least

one quarter of US women have not been screened within the last 3 years, and within some subpopulations, this number may be as high as one half [36].

According to a 2010 national US study, 76 % of women reported having a Pap test within the past 3 years; however, screening varied by race and ethnicity with, for example, only 66 % of Asian Americans having been screened [36]. These data are almost certainly overestimates, with adjustment for self-report suggesting Black and Hispanic women may have three-year screening rates as low as 58 and 51 %, respectively [37]. Screening rates appear to decrease with age, although increase with higher income, greater education, having insurance and a medical home [38]. The ability to locate women who have not been screened regularly and ensure that they attend screening and return for follow-up care, if indicated, remains a primary challenge to increasing screening rates in the USA.

Current guidelines from the United States Preventive Services Task Force (USPSTF) and the American Cancer Society (ACS), the American Society for Colposcopy and Cervical Pathology (ASCCP), the American Society for Clinical Pathology (ASCP) recommend cytology screening every 3 years for women aged 21–29, and co-testing with Pap and HPV testing every 5 years for women aged 30–65. Both ACS/ASCCP/ASCP and USPSTF also offer the option of cytology screening alone every 3 years for women aged 30–65, though ACS/ASCCP/ASCP cite a preference for co-testing over cytology alone. The guidelines recommend that women over the age of 65 who have had routine screening with normal results should not continue screening [9, 39].

Screening errors

About one-third of cervical cancer cases are missed due to screening errors [35, 40]. Errors in sampling, interpretation, or follow-up may result in missing cervical cancer or cervical disease going undetected and untreated. New HPV testing for women aged 30 years and above offers the potential to increase the ability to detect cervical lesions, and their use could notably increase screening program's sensitivity. Since many women are not screened frequently enough, they should receive the most effective screening methods possible when they do get screened. Despite improved sensitivity and negative predictive value of combined Pap and HPV tests for the detection of high-grade cervical lesions, uptake of co-testing has been relatively slow [41]. Furthermore, while a CDC survey found that more than 75 % of healthcare providers reported ever using HPV testing, many providers used HPV testing incorrectly, such as for screening women under the age of 30 [42]. Additionally, summit participants agreed that colposcopy performance needs improvement in order to reduce detection errors in women receiving follow-up testing due to abnormal cytology results.

Not receiving follow-up care

About 13 % of cervical cancer deaths are caused by lack of follow-up care after women have had abnormal screening or diagnostic results [43, 44]. Although patient characteristics such as age, race or ethnicity, rural residency, primary language, income level, insurance status, health beliefs, and available social support have been associated with not accessing follow-up care [43, 44], system-level factors may be the most important culprit. The lack of

effective recall systems often leads to women “falling through the cracks” after an abnormal Pap or HPV test result. If results or reminders are not delivered or understood, women may be unaware that follow-up is needed. Even in community health centers and many family planning clinics, women who receive abnormal cytology results from one health center often need to seek colposcopy, pathology services, and treatment at another center, which creates a barrier to care. Financial barriers also exist for uninsured women when there is no assurance of coverage for follow-up care (e.g., colposcopy, pathology services) after abnormal Pap smears.

The promise of the Affordable Care Act (ACA)

The patient protection and Affordable Care Act of 2010 (ACA) promises to make quality healthcare affordable and accessible for most Americans. With a focus on prevention through collaboration and community partnerships, the ACA presents new opportunities for reaching lower-income women and improving cervical cancer prevention nationally. Hallmarks of the legislation include increased use of evidence-based medicine, the establishment of a medical home, and a focus on data collection. Along with advancing the use of electronic health records and e-health care, an influx of community healthcare professionals in rural communities will help build the infrastructure for a system of continuity and coordination. Funding also will increase for community clinics, enabling more women to receive services.

The ACA requires new health plans to cover recommended preventive services, including cervical cancer screening as of March 2011, and vaccination as of January 2011, with no cost-sharing for either preventive screening or vaccination [45]. A Commonwealth Fund report found that nearly half of low-income women spent 10 % or more of their income on premiums and out-of-pocket medical costs and nearly 65 % delayed or avoided care due to these costs [46]. The ACA increases access to health coverage by expanding eligibility for Medicaid and assisting low-income individuals and families with the purchase of private insurance coverage. Cervical cancer screening will also be free for people on Medicare, according to the USPSTF recommendations. The ACA also allows children to remain on their parents’ insurance plans until the age of 26 and benefits those with multiple health issues, including women diagnosed with cervical cancer, by removing annual and lifetime dollar limits for essential services. Additionally, women with pre-existing conditions, including cervical neoplasia, can obtain immediate access to insurance.

The passage of the ACA represents notable progress toward ensuring healthcare coverage for all Americans; however, many people will inevitably continue to fall through the cracks, notably those eligible for Medicaid but not enrolled, and undocumented immigrants. Safety nets within communities must continue to be funded and resourced adequately, so that potentially all people can benefit from appropriate healthcare services. Access barriers will remain even after implementation of ACA, since Medicaid expansion will not be implemented in all states, [47, 48] and currently only an estimated 63 % of Medicaid-eligible adults participate in Medicaid [49].

Addressing barriers to cervical cancer prevention: recommendations

Participants of the one-day summit made 12 recommendations in three areas: programs and policies, cervical cancer screening, and HPV vaccination (Table 2).

Programs and policies

Recommendation 1—Ensure that underserved women know what preventive services are available and where to access them.

Federal agencies, medical associations, and individual healthcare providers should be encouraged to improve communication among each other and with the public about the availability of screening and vaccination services for underserved women. For example, FQHC have the potential to notably increase service utilization, particularly with their increased funding and role in the ACA. This only can be achieved, however, if women are aware of and consequently access preventive services offered by FQHC. Media campaigns and outreach programs, conducted in a culturally appropriate and relevant manner, could help communicate the need for prevention and the availability of screening and vaccination services to uninsured and minority women. Promotoras (Spanish-speaking community health workers or health promoters), lay health workers, peer educators from faith-based institutions, and other trusted sources can facilitate access to these services [50, 51]. Patient navigator programs (programs that move an individual in a timely manner across the entire healthcare continuum from prevention to diagnosis to treatment) can also assist women in obtaining needed healthcare services. The Community Preventive Services Task Force recommends small media campaigns and one-on-one education in cervical cancer prevention interventions. Further research is needed on mass media campaigns, group education, and reducing structural barriers (as with patient navigator programs), as the Community Guide cites insufficient evidence to recommend these interventions for cervical cancer prevention [52].

Recommendation 2—Advocate for coverage of evidence-based screening, diagnostic, and treatment services for all underserved women.

To ensure that all women are able to access and afford appropriate screening, diagnostic, and treatment tools, participants agreed to advocate for continuous coverage of colposcopy and biopsy (pathology) services for all women, including those covered by Medicaid or Medicare, as well as those accessing services through FQHC and family planning clinics. Another step would be to implement HPV/cytology co-testing coverage to women aged 30 years and above within federal and state-funded programs, including NBCCEDP, as recently recommended by the ASCCP/ACS/ASCP and the USPSTF.¹ Offering cervical cancer screening to women entering into Medicaid or Medicare could benefit women who have not regularly accessed screening. Participants also discussed the need to ensure coverage for non-US residents and for women living in the USA for less than 5 years, as these women will remain uninsured despite insurance coverage changes enacted by the ACA.

¹In March 2012, the ASCCP/ACS/ASCP and the USPSTF included HPV testing in their updated recommendations.

Recommendation 3—Improve information sharing among healthcare delivery systems.

Creating a coordinated information system among FQHC, NBCCEDP, state and local health departments, schools, pharmacies, insurers, and private primary care practices will ensure continuity of preventive, diagnostic and treatment services. This is particularly important for women with abnormal cytology results who receive screening from one program and may need follow-up diagnostic services or treatment through another program. Individuals who receive HPV vaccination in a delivery site other than their primary provider also will benefit. Electronic medical records can offer a method for tracking services received, both in publicly and privately financed programs. Changes ensuing from passage of the ACA should advance this recommendation.

Recommendation 4—Advocate for increased funding to the NBCCEDP.

Limited funding has prevented NBCCEDP from reaching all eligible women with critical cervical cancer prevention services as a payer of last resort. While there are measures in place to provide cervical cancer preventive services, NBCCEDP is a safety net for women ineligible for other programs. Increased funding can improve the percentage of women reached by the NBCCEDP from a mere 9 % of eligible women aged 18–64 to an ideal 100 %² [20].

Cervical Cancer Screening

Recommendation 5—Reach unscreened women when they come into contact with the healthcare system.

Reaching women when they access the healthcare system offers one mechanism to increase screening rates. Providers can be trained to offer cervical cancer prevention reminders to women before hospital discharge after giving birth, after receiving a tubal ligation, when seeking healthcare services for their children, or upon entering Medicaid or Medicare. Providers other than OB/GYNs, particularly primary care physicians, should be encouraged to routinely offer cervical cancer prevention services to their eligible patients, track screening/vaccination histories and create and implement reminder programs. By encouraging screening practices, history review, and use of reminder programs, unscreened women can be reached by a broader scope of healthcare providers. Increasing the number of female and minority providers through the Federal Health Resources and Services Administration's National Health Service Corps also could help reach underserved women.

Recommendation 6—Encourage and reinforce the need for providers to follow current screening guidelines.

Healthcare providers across the country can improve services for their patients by using optimal screening techniques at the recommended intervals as outlined in professional screening guidelines. Several organizations currently publish cervical cancer screening guidelines, causing confusion among providers as to what schedule to follow, what tests to

²The ACS/ASCCP/ASCP and the USPSTF 2012 recommend screening begin at 21 years of age.

use, and when to begin and discontinue screening. Recently released national ASCCP/ACS/ASCP screening guidelines establish consistency among their guidelines. Communicating them effectively to healthcare providers is the first step in providing women with improved services and the best available technologies.³

Recommendation 7—Establish state registries to improve screening and follow-up care.

State screening registries should be established to identify women not screened in more than 5 years, particularly in rural and other high-risk areas. Private insurance, Medicare and Medicaid records can assist with this effort. Such registries also would enable recall of women with abnormal Pap tests or HPV-positive tests, helping to increase the number of women receiving necessary follow-up care.

HPV Vaccination

Recommendation 8—Educate providers, patients, and the public.

Numerous misconceptions still exist about HPV vaccine effectiveness and safety and the importance of vaccinating girls before becoming sexually active. Given that studies show vaccination rates are higher when providers recommend the vaccine [53], healthcare providers should receive training on how to initiate the conversation with parents and how to specifically respond to parents who say that their daughters are not sexually active. By providing accurate educational information, healthcare providers could help ease potential concerns of parents. Participants agreed that healthcare providers should be encouraged to proactively offer the vaccine to age-appropriate adolescents. Communication should include the fact that younger populations (more likely to not be sexually active) obtain better immune responses to vaccination than mid-adolescents and adults. Public health communication campaigns created by public health advocates, in addition to industry, also can educate the public.

Recommendation 9—Expand school-located HPV vaccination programs.

School-located vaccination programs have been highly successful in Canada, England, Scotland, and Australia [28, 29, 54, 55]. The main challenge to creating effective school-located immunization programs is building capacity within local health departments and other agencies to support school-located vaccination programs, as only around 6 % of US schools now have school health centers that could independently handle vaccine delivery and billing for the provision of adolescent vaccines, including HPV [31, 56]. Given the financial challenges inherent in the school-located clinic model, alternate models (all with a goal of financial sustainability and scalability) must be developed and tested. Furthermore, because under-immunization arises, in part, from economic disparities, school-located immunization programs should be developed to serve pre-teens and teens across the

³Consistency among guidelines has been accomplished over the past year, with the American Cancer Society, the American Society for Colposcopy and Cervical Pathology and the American Society for Clinical Pathology issuing joint guidelines that are essentially the same as the newly released USPSTF guidelines. In addition, the American College of Obstetrics and Gynecologists endorsed these guidelines and is expected to update their own guidelines to match them.

economic spectrum. As such, school-located programs must be designed to accept uninsured and publically insured students, as well as privately insured students.

In the USA, pilot vaccination programs in schools have identified barriers including privacy concerns, reimbursement issues, inadequate state immunization registries, and laws that restrict record linkage between schools and students' healthcare providers, which in turn can hamper reimbursement through Medicaid, private insurers, or other programs [31]. For example, restrictions in the family education rights and privacy act (FERPA) need to be eased by the department of education to facilitate the reporting of adolescent vaccination records between healthcare providers and schools. Electronic parental consent or opt-out parental consent could also simplify and increase the effectiveness of school-located vaccination programs.

Finally, acceptance of HPV immunization may be higher in programs where HPV vaccines are offered in addition to other vaccines that are recommended for routine use in pre-teens and teens (i.e., tetanus–diphtheria–acellular pertussis vaccine, quadrivalent meningococcal conjugate vaccines, influenza vaccines) [57].

Recommendation 10—Expand HPV vaccination within pharmacies and other alternate delivery sites.

More than 185,000 pharmacists in the USA are trained to administer vaccines to people of all ages [58]. The USA's 60,000 community retail pharmacies, including independent drug stores, chain drug stores and pharmacies in supermarkets and other retail merchants, provide a promising platform for delivering adolescent vaccines including HPV vaccine [59]. Many states already allow pharmacists to provide HPV vaccine. For example, in New Mexico pharmacists may provide HPV vaccine to patients under a protocol agreement with a physician. Idaho and Oregon also have relatively liberal provisions allowing pharmacists to vaccinate. However, some states' current legal and regulatory structures hamper efforts to broaden and standardize pharmacists' role in HPV vaccination. For example, state restrictions, such as minimum patient age and prescription requirements, limit pharmacists' authority to administer immunizations. While pharmacists may provide HPV vaccine to patients in states such as Missouri and Georgia, they may only do so if the patient has a prescription. Additionally, immunization documentation and communication between pharmacies and healthcare providers would need to be facilitated to share patients' vaccination data, such as through statewide vaccination registries or interoperable electronic health records. As HPV vaccination is currently a three-dose series, a pharmacist could provide all three or two of the doses following initial evaluation by a physician. Recommendations of alternate delivery sites to offer HPV vaccine include sexually transmitted disease and family planning clinics, particularly to adolescents who qualify for VFC.

Recommendation 11—Advocate for increased use of HPV vaccination registries with reminder/recall systems. National and state policies should encourage use of their states' vaccination registries and reminder/recall systems. Though state vaccination registries exist now, use varies widely among health care providers and among states. Use of reminder/

recall systems improves vaccine uptake by around 17 % [60, 61], but health care providers rarely use the systems. Studies suggest that centralized implementation of reminders and recalls by county or state health departments may be more effective than clinic implementation of reminder/recall [62].

Recommendation 12—Facilitate Medicaid and other programs to reimburse HPV vaccination, including allowing alternative delivery sites to become in-network providers.

Financial barriers continue to create a barrier to HPV vaccine access and uptake. Although private insurers, Medicaid, and the VFC program cover HPV vaccination, anecdotal evidence shows that providers often encounter reimbursement challenges. Even pilot programs with mechanisms for billing have faced reimbursement barriers. In Colorado, for example, a successful school-located pilot program was unable to receive reimbursement for some students covered by PCP-Medicaid, as permission was needed from students' Medicaid providers, thus increasing the complexity and cost of the program [31].

Conclusion

The Cervical Cancer-Free America summit called for a collaborative approach among a wide range of stakeholders to prevent cervical cancer. To improve clinical outcomes, cervical cancer needs to be addressed as a disease with respect to access to healthcare services and culturally relevant and appropriate communications and education. States are uniquely positioned to contribute to the overall effort by distributing resources equitably, increasing screening and vaccination rates, improving follow-up care, and establishing evidence-based models that can be scaled up across the country. By incorporating best practices, CCFA and key stakeholders can work together to dramatically reduce cervical cancer in the USA.

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List of symbols

ACA	Affordable Care Act of 2010
ACIP	Advisory Committee on Immunization Practices
ACS	American Cancer Society
ASCCP	American Society for Colposcopy and Cervical Pathology
ASCP	American Society for Clinical Pathology
CCFA	Cervical Cancer-Free America
CDC	Centers for Disease Control and Prevention

CHIP	Children's Health Insurance Program
FDA	Food and Drug Administration
FERPA	Family Education Rights and Privacy Act
FQHC	Federally Qualified Health Centers
HPV	Human papillomavirus
NBCCEDP	National Breast and Cervical Cancer Early Detection Program
Pap	Papanicolaou
UNC	University of North Carolina
USPSTF	United States Preventive Services Task Force
VFC	Vaccines for Children

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Table 1

The Carolina Framework for fighting cervical cancer

Key challenges to eradicating cervical cancer	
1	<i>Low HPV vaccination coverage</i> HPV vaccination offers protection against the two HPV types (16 and 18) responsible for more than 70 % of cervical cancers. HPV vaccines are underused among adolescent females, with just over half of 13–17-year-old girls having started the three-dose vaccine series. As of 2011, only 35 % of girls in this age range had received all three doses in the series [24]
2	<i>Lack of screening</i> At least 50 % of cervical cancer cases are due to lack of screening [34]. Although cervical cancer screening is highly effective for reducing cervical cancer mortality, at least one quarter of women in the USA have not been screened in the last 3 years and that number may be as high as half in some populations
3	<i>Screening errors</i> About one-third of cervical cancer cases are due to Pap screening errors [34]. Combining more sensitive HPV testing with Pap testing in women ages 30–65 may increase the ability to detect precancerous lesions
4	<i>Not receiving follow-up care</i> One in eight cervical cancer cases is due to lack of follow-up for abnormal Pap smear results [33, 34]. This problem particularly affects women from minority groups and rural areas

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Table 2**Recommendations for addressing barriers to cervical cancer prevention**

Programs and policies

Recommendation 1: Ensure that underserved women know what preventive services are available and where to access them

Encourage appropriate federal agencies, medical associations, and individual healthcare providers to improve communication regarding availability of screening and vaccine services

Use culturally appropriate and relevant outreach services to recruit more minority women patients (peer educators, lay health workers, promotoras)

Use patient navigator programs to keep women in the healthcare system

Recommendation 2: Advocate for coverage of evidence-based screening, diagnostic, and treatment services for all underserved women

Ensure continuous coverage of colposcopy, biopsy, and excisional treatment (pathology) services within Medicaid and Medicare

Offer cytology/HPV screening when women enter Medicaid or Medicare

Expand coverage to women living in the USA for less than 5 years as these women are not covered by the ACA

Recommendation 3: Improve information sharing among healthcare delivery systems

Create a coordinated information system among FQHC, the NBCCEDP, state and local health departments, schools, pharmacies, insurers, and private primary care practices

Ensure continuity of treatment services for uninsured women following abnormal Pap tests

Implement electronic medical record (EMR) registries to track screening and vaccination status/results

Recommendation 4: Advocate for increased funding to NBCCEDP

Enable all eligible women to access cervical cancer prevention services

Cervical cancer screening

Recommendation 5: Reach women when they come into contact with the healthcare system

Train providers to offer screening at various points of contact with the healthcare system (childbirth, tubal ligation, entry into Medicaid/Medicare)

Involve primary care physicians in screening

Educate/incentivize healthcare providers to track screening status and use reminder systems

Recommendation 6: Encourage and reinforce the need for providers to follow current screening guidelines

Prevent overscreening and overtreatment of women and misallocation of resources by working with providers and potentially incentivizing clinicians to screen at recommended intervals

Communicate medical associations' guidelines to healthcare providers to provide women with improved services and the best available technologies

Recommendation 7: Establish state registries to improve screening and follow-up care

Identify women not screened in the last 5 or more years using Medicaid/Medicare records as major resource

Enable recall of women with abnormal Pap- or HPV-positive tests to reduce loss to follow up

HPV vaccination

Recommendation 8: Educate providers, patients, and the public

Encourage healthcare providers to proactively offer HPV vaccination to patients

Raise awareness through public health communication campaigns to help correct misconceptions about HPV vaccination safety and effectiveness, and importance of vaccine

Recommendation 9: Expand school-located HPV vaccination programs

Address barriers such as privacy concerns, funding and laws restricting record linkages

Ease FERPA restrictions to facilitate sharing of vaccination records between healthcare providers and schools

Allow for electronic parental consent to increase reach of school-located programs and improve the process

Recommendation 10: Expand HPV vaccination within pharmacies and alternate delivery sites

Expand state regulations to permit HPV immunization by pharmacists

Share vaccine coverage data by linking records between pharmacies and healthcare providers

Offer the HPV vaccine at alternate sites such as sexually transmitted disease and family planning clinics

Recommendation 11: Advocate for increased use of HPV vaccination registries with recall systems

Enable patient tracking to ensure girls receive all three vaccination doses

Ensure prompt recalls to improve completion of the vaccination series

Recommendation 12: Facilitate Medicaid and other programs to reimburse HPV vaccination, including allowing alternative delivery sites to become in-network providers

Address billing and reimbursement challenges faced by vaccination programs located in schools, pharmacies, and other alternative sites

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