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Reducing Cancer Risk Through Primary Prevention Activities Among Children: A Demonstration Project

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Abstract

Context: Opportunities to reduce the risk of cancer, including cervical, liver, and skin cancer, start early in life. To encourage adoption of primary prevention activities in childhood to reduce cancer risk later in life, Centers for Disease Control and Prevention conducted a demonstration project with 3 National Comprehensive Cancer Control Program (NCCCP) recipients.

Program: Iowa, Northwest Portland Area Indian Health Board (NPAIHB), and Pennsylvania NCCCP recipients implemented evidence-based primary prevention activities for cervical, liver, and skin cancer among children using health care provider education, patient education, and policy development.

Implementation: Iowa implemented an announcement approach to improve provider education on human papillomavirus (HPV) vaccination. Pennsylvania focused on patient education for reducing skin cancer risk and both provider and patient education for liver cancer prevention. NPAIHB created a sun safety intervention for tribal organizations, including a policy guide, media materials, and patient education.

Results: In Iowa, health care providers taking the announcement approach reported significantly higher mean scores on a posttest compared with a pretest regarding perceptions about HPV vaccination, self-efficacy, and behavioral intentions related to vaccination. Pennsylvania integrated

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sun safety education and sunscreen dispenser programs as a health and wellness initiative in 8 state parks and the Pennsylvania Department of Conservation and Natural Resources incorporated the program in its Pennsylvania Outdoor Recreation Plan. Pennsylvania also implemented health care provider education on the primary prevention of liver cancer through hepatitis B and hepatitis C screening and hepatitis B vaccination. The NPAIHB skin cancer policy guide was created and distributed for use to all 43 federally recognized tribes of Oregon, Washington, and Idaho served by NPAIHB.

Discussion: The identification, dissemination, and implementation of these efforts can serve as best practices for future childhood primary prevention programs. NCCCP recipients and public health professionals can use health care provider education, patient education, and policy development to reduce future risk for cervical, liver, and skin cancer among children.

Keywords

cancer risk; primary prevention

Recent estimates suggest that more than 40% of all cancer deaths may be caused by preventable risk factors.[1] Reducing the risk of many cancers, including liver, cervical, and skin cancer, can begin in childhood. Hepatitis B virus (HBV) and human papillomavirus (HPV) vaccination to prevent liver and HPV-associated cancers, including cervical cancer, are administered during childhood or adolescence.[2,3] Excess sun exposure, indoor tanning, and sunburns during childhood increase a person's risk of skin cancer later in life.[4] However, only about 62% of all adolescents in the United States are up to date with HPV vaccination, and each year, more than half of US high school students get sunburned at least once.[5,6] Liver cancer and melanoma incidence rates have been increasing over the past 2 decades with more than 35 000 and 88 000 annual cases of liver cancer and melanoma, respectively.[7] Although HBV vaccine is recommended for all infants, nearly 10% of all children have not received HBV vaccination by age 24 months.[8] Primary prevention interventions for cancer prevention among children, including HPV and HBV vaccination and sun safety programs,[9–12] are recommended by several organizations, including the Advisory Committee on Immunization Practices,[2,3] the Community Guide,[13] the National Academies of Sciences, Engineering, and Medicine,[14] the American Academy of Pediatrics,[15] and Healthy People 2030.[16]

The National Comprehensive Cancer Control Program (NCCCP) supports cancer control activities in the United States, including primary prevention, in all 50 states, the District of Columbia, 8 associated Pacific islands/territories, and 7 tribes and tribal organizations.[17–19] To encourage adoption of evidence-based primary prevention activities in childhood to reduce cancer risk later in life, Centers for Disease Control and Prevention (CDC) conducted a demonstration project from 2019 to 2022 with 3 NCCCP recipients. The demonstration was intended to assess the feasibility of scaling up evidence-based primary cancer prevention practices among children. NCCCP recipients in Iowa, the Northwest Portland Area Indian Health Board (NPAIHB), and Pennsylvania were funded to identify and implement evidence-based primary prevention activities for liver, cervical, and skin cancer among children in their jurisdictions to reduce the risk of cancer later in life. The recipients had varying degrees of capacity for implementation and evaluation and were

also challenged by the COVID-19 pandemic. This article describes the implementation and dissemination of the demonstration project activities and provides lessons learned and implications for other programs planning to implement similar programs.

Approach, Implementation, and Dissemination

Iowa, NPAIHB, and Pennsylvania used 3 strategies to reduce cancer risk through the implementation of primary prevention activities: (1) health care provider education, (2) patient education, and (3) policy development (Table 1). From September 2020 to April 2022, Iowa implemented an evidence-based cervical cancer intervention to increase health care provider HPV vaccination recommendations.[20] Iowa selected this intervention as HPV vaccination completion rates were lower than other adolescent vaccination rates in the state.[21] In addition, multiple counties in Iowa, particularly those in rural settings, had lower HPV vaccination rates compared with the state average.[21] From November 2020 to June 2022, Pennsylvania aimed to reduce skin cancer risk through patient education and implemented provider and patient education programs to reduce the risk of liver cancer.[22–24] At the time of this demonstration project, melanoma was the sixth leading cause of cancer in Pennsylvania, and the 2019–2023 Pennsylvania Cancer Control Plan had a goal of increasing primary prevention activities to reduce the risk of skin cancer.[25,26] Hepatitis C virus (HCV) infection is a major risk factor of liver cancer. The incidence of HCV in Pennsylvania was increasing, and Pennsylvania reported the second highest prevalence of chronic HCV infections in the United States in 2019.[25,27] Therefore, the 2019–2023 Pennsylvania Cancer Plan had a goal of reducing the incidence of HCV among adolescents and young adults by 25% through strategies aimed at increasing knowledge about liver cancer prevention among providers.[25] Based on these factors, Pennsylvania addressed skin and liver cancer prevention.[22,28] From May 2020 to December 2021, NPAIHB addressed sun safety policy and patient education as American Indian and Alaska Native (AIAN) persons have the second highest incidence rates of melanoma and lower 5-year survival rates compared with non-Hispanic White persons and lower use of certain sun safety practices.[7,28,29] As part of this demonstration project, sites received specific and tailored technical assistance (TA) to support implementation, monitoring, and data collection. Iowa, NPAIHB, and Pennsylvania were assigned a project-specific TA liaison who organized monthly TA calls and participated in community of practice calls with all recipients.

Health Care Provider Education

Iowa partnered with the American Cancer Society, the University of Iowa Cancer Prevention and Control Research Network, and Des Moines University with the goal of increasing HPV vaccination among children eligible for the HPV vaccine through implementation of an HPV-specific announcement approach,[30–32] an evidence-based intervention that trains health care professionals to make HPV vaccine recommendations. Iowa originally intended to implement this program in clinics located in a specific area in southeastern Iowa due to low HPV vaccination rates. However, due to COVID-19–related staffing limitations, recruitment was broadened to all counties in Iowa, and 11 clinics agreed to participate in the demonstration project. Most of the participating clinics were public health clinics that served rural or micropolitan communities. The implemented model involves working with

a previously trained physician champion to train other health care professionals.[33] The goal of this training was to increase the self-efficacy of health care providers to recommend HPV vaccination. The training was a 1-hour webinar that covered common barriers to HPV vaccination and suggested dialogue and talking points to be used with patients and parents. Participants were able to receive continuing education (CE) credits for the training. Iowa intended to evaluate their intervention through a pre- and posttraining survey, tracking of vaccine doses before and after the intervention, and through a closeout interview with clinics. A pre/postsurvey containing 4 statements with a Likert scale was conducted among webinar participants to measure the effectiveness of the intervention. The statements were (1) “Routinely recommending HPV vaccine is important to me.” (2) “I feel confident addressing parents’ concerns about HPV vaccine.” (3) “I plan to routinely recommend HPV vaccine when patients turn 11 or 12.” (4) “Most parents think HPV vaccine is important for their 11- or 12-year-olds.” To measure differences between pre- and posttest scores, a *t* test (2-sample assuming unequal variances) with a *P* value <.05 was used to assess statistically significant differences in the means. In addition, at the end of the demonstration period, all participating clinics were invited to participate in a closeout interview. Five clinics accepted the invitation and participated. One interview was conducted per clinic and in some cases multiple people participated in the interview for a total of 8 overall respondents representing the 5 clinics. Interviews were 30 minutes in length and conducted by phone using a semistructured interview guide that queried respondents about experiences participating in the intervention, including barriers, challenges, and lessons learned. The interview was designed in conjunction with the evidence-based HPV announcement approach training to mirror the different components of the intervention. Interviews were audio recorded for accuracy and notes were used to conduct simple thematic analysis and summarize data and identify common themes.

Pennsylvania collaborated with the Pennsylvania Division of Immunizations Perinatal Hepatitis B Coordinator, the Pennsylvania Bureau of Epidemiology, Viral Hepatitis Elimination Program, and the Perinatal Hepatitis C Coordinator to increase health care provider education on the primary prevention of liver cancer through HBV and HCV screening and HBV vaccination. The specific goals were to (1) increase knowledge about the importance of early screening for HBV and HCV during pregnancy; (2) increase infant HBV vaccination; (3) increase knowledge about the importance of linkage to care for mothers with acute or chronic hepatitis; (4) increase knowledge about the importance of serology testing for babies born to hepatitis B surface antigen positive women and HCV ribonucleic acid positive women; and (5) increase knowledge around prenatal screening of pregnant women for hepatitis B and C surface antigen.[34–37] The activities included the development and distribution of educational materials and following 2 webinars (for CE credit): (1) Hepatitis B Online: Preventing HBV Perinatal Transmission and (2) Hepatitis C Online: HCV Perinatal Transmission. These were made available on Pennsylvania Train Education, a free statewide online learning platform.[35,36] To help launch the trainings, a live educational webinar was provided at the Cancer Navigation and Survivorship Network, which facilitates the dissemination and implementation of patient-centered navigation across the cancer control continuum in Pennsylvania.[38] To evaluate their health care provider activities, tracked completion of CE activities.

Patient Education

Pennsylvania conducted patient education with the goals of increasing awareness of HBV and HCV, the link to liver disease and cancers, increasing knowledge of screening, HBV vaccination for adults and children, treatment, and decreasing stigma of viral hepatitis. To accomplish this, patient education materials, including brochures on pregnancy and HBV/HCV, were developed and distributed through a statewide health equity tour, the Pennsylvania Health Exchange (PENNIE) tour.[39] Pennsylvania also partnered with the Pennsylvania Department of Conservation and Natural Resources (DCNR) and Impact Melanoma on the implementation of a sun safety education program at parks. DCNR selected 8 Pennsylvania state parks with swimming and/or boating recreational areas to participate in the sun safety program. These parks were selected using Pennsylvania cancer registry data to identify counties with high melanoma incidence rates. The program incorporated a skin cancer educational training on sun-protective behaviors along with the placement of sunscreen dispensers (2 per park) and sun-protective messaging in the parks. The intervention was based on the strong evidence for the effectiveness of increasing sunscreen use in outdoor recreational and tourism settings, as recommended by the Community Preventive Services Task Force.[40] The intervention included training park management, senior staff, and employees who lead youth educational groups. The training covered melanoma incidence in Pennsylvania by county, sex and race, sun-protection strategies, modeling of sun-protective behaviors, and management of sunscreen dispensing stations with signage in English and Spanish. The intervention was evaluated through a posttraining survey and through distribution of materials throughout the parks.

NPAIHB focused on patient education with a goal of increasing sun-protective behaviors among AIAN youth in the Pacific Northwest through an evidence-based multicomponent community-wide intervention to reduce excess sun exposure in childhood.[41] These efforts included (1) tailoring a high-school based curriculum on sun safety in AIAN communities[42]; (2) developing media to promote sun safety messaging and skin cancer prevention among AIAN youth in the Northwest; and (3) developing patient education materials related to sun safety for use in tribal health clinics. To help ensure cultural relevancy NPAIHB conducted interviews with high school aged American Indian/Alaska Native youth from the Northwest to solicit input on the curriculum and materials. Messaging and media products were also presented to the Northwest Tribal Youth Delegates to obtain their feedback. Resources for evaluating these activities were limited and included basic metric tracking for digital media and dissemination.

Policy Development

NPAIHB also developed and distributed a policy guide to increase sun-protective behaviors. The policy guide was designed to address multiple audiences, including tribal schools and tribal community leaders interested in championing sun safety in their schools and communities.[43] The policy guide included following 4 elements: (1) a sun safety overview with examples from tribal, state, and school sun safety policies (eg, highlighting high AIAN skin cancer mortality rates compared with other populations); (2) information on the preparation and implementation of sun safety policy in a tribal context (eg, emphasizing

the importance of building partnerships with local indigenous communities and tribal councils); (3) an evaluation guide, including types of evaluation, examples, and information on measuring change (eg, examples of process and outcomes evaluations); and (4) sun safety resource documents, including adaptable templates, flyers, and printable resources tailored to AIAN communities.[43] This comprehensive guide collected feedback from content matter experts from CDC, NPAIHB, and local tribal communities to make improvements to the guide.

Results

Health care provider education

In Iowa, a total of 48 health care providers attended the HPV vaccination training webinar with 41 and 29 webinar participants completing a pretest and posttest survey, respectively. Participants reported statistically significant higher mean scores on all posttest items compared with the same pretest items (Table 2). After the webinar, participants placed higher importance on routinely recommending HPV vaccination (4.6 vs 4.5), more confidence addressing parent's concerns about the HPV vaccine (4.3 vs 3.9), higher intention to routinely recommend the HPV vaccine (4.7 vs 4.4), and greater awareness of parental attitudes toward HPV vaccination (3.4 vs 3.1). The 5 clinics participating in the closeout interviews described facilitators and barriers to the announcement approach (Table 3). Clinics specifically reported that the training webinar and having a physician champion facilitated implementation of the announcement approach. Reported barriers included noncompliance with the second HPV dose, COVID-19–related interference with reminder/recall systems, and COVID-19–related clinic closures. Reported challenges related to HPV vaccination included parent misinformation and the lack of a school HPV vaccine requirement. Participants also described how scheduling the next immunization visit before patients left the office and using a reminder/recall system to improve immunization scheduling could help with encouraging patient follow through.

In Pennsylvania, provider education around liver cancer included the development and distribution of a variety of educational materials including 2 CE webinars. Perinatal Hepatitis B and C brochures and rack cards were developed and distributed to 93 provider offices. Brochures were also promoted via the Pennsylvania Vaccines for Children newsletter. Other educational materials that were developed included Spanish perinatal HBV and HCV posters for provider offices. The launch of the webinars was delayed due to the focus on COVID-19 priorities and launched nearly a year later than intended. Between March 1, 2022, and April 5, 2022, 58 providers and public health staff completed the Perinatal Hepatitis B training and 27 providers and public health staff took the Perinatal Hepatitis C training modules.

Patient education

In NPAIHB, all sun safety pilot project materials were made available through the NPAIHB Web site to the 43 federally recognized tribes in the NPAIHB region as a comprehensive sun safety intervention. The patient education materials were launched in May 2020 during skin cancer awareness month across NPAIHB's social media platforms, including

Facebook and Instagram.[44] During the month of the launch, the combined social media posts gained 40 engagements and had a reach of 336. A patient education poster was also developed with culturally relevant graphics to encourage sun-protective behaviors among AIAN communities in the region.[44] These materials were also disseminated to all 43 tribal clinics in NPAIHB. To further the reach of the project, NPAIHB presented to the Native American Research Center for Health (NARCH): Northwest NARCH Cancer Training: Increasing Melanoma Awareness and Prevention in Northwest Tribal Youth at the Northwest NARCH Fellowship Program in Portland, Oregon. In February 2021, NPAIHB presented Increasing Melanoma Awareness and Prevention in Northwest Tribal Youth at the Northwest Tribal Health Conference in Portland, Oregon.[44]

In Pennsylvania, patient education around liver cancer was mostly delivered through participation in the PENNIE health equity tour, which covered health fairs in 14 Pennsylvania counties.[39] Perinatal HBV and HCV posters and patient brochures in both English and Spanish were displayed and distributed at all health fairs in the 14 counties. In addition, through a partnership with the YMCA, perinatal HBV and HCV posters were displayed at YMCA locations in the 14 counties of the PENNIE health equity tour.[39] Public messaging for these activities was done in conjunction with the PENNIE health tour and YMCA. The Pennsylvania DCNR has continued the sun safety education and sunscreen dispenser programs as a health and wellness initiative in its 2020–2024 Statewide Outdoor Recreation Plan with 12 new state parks added to the program.[45] The Pennsylvania DCNR conducted a post–sun safety training survey assessment on knowledge and behaviors and attitudes among park staff. Overall, 90% of park staff thought training content was relevant to their work, 98% of park staff correctly answered posttraining knowledge check, and 75% of staff supported workplace policies aimed at protecting staff and visitors. DCNR program managers were also asked to comment on success of program, public perception, concerns, and issues with materials. The overall responses indicated that the public utilized the sunscreen, there were no complaints from visitors or staff, and dispensers were easy to maintain and keep filled. This sun safety plan has received statewide media coverage with at least 5 news stories and recognition from the Pennsylvania Governor’s office.

Policy development

The NPAIHB policy guide and resource documents were disseminated to the 43 federally recognized tribes of Oregon, Washington, and Idaho served by NPAIHB.[43] It was also made available on the NPAIHB Cancer Program Web site for download and immediate use for any school or community program prioritizing sun safety.[43,44]

Discussion

This pilot project facilitated implementation of evidence-based primary prevention interventions among children to reduce their risk for cancer later in life. Iowa, Pennsylvania, and NPAIHB demonstrated how health care provider education, patient education, and evidence-based policy development can be used to implement prevention activities.

Iowa demonstrated the utility of a announcement approach to encourage HPV vaccination. Effective provider recommendations for vaccination have been successful in a variety of

settings to improve HPV vaccine uptake,[46] and the webinars conducted in Iowa were well received and improved providers' confidence to deliver effective vaccine recommendations. While Iowa successfully implemented 1 intervention, there may be additional considerations for other NCCCP recipients interested in this approach that may increase the effectiveness of vaccination programs. Studies have found that multicomponent interventions are most effective at increasing HPV vaccine uptake.[47,48] Providers who achieve high HPV vaccination coverage in their patient population tend to not only provide a vaccine recommendation in an effective manner but also incorporate into their clinic workflows processes such as team-based communication, provider reminders, client reminders, and encouraging parents to make future vaccine appointments before leaving a clinic visit.[49] These providers are more likely to track and be aware of their HPV vaccination rates. Although HPV vaccination coverage has improved over the years, interventions may need to be scaled to reach more providers and sustainability practices incorporated for existing ones.[31] In addition, improving reach into rural areas was challenging for Iowa during the COVID-19 pandemic, and will be an important area of consideration for others adapting this type of intervention.[50]

Pennsylvania developed and disseminated several hepatitis and liver cancer resources, including the development of Perinatal HBV and HCV trainings for health care providers. Liver cancer education has been shown to increase knowledge and awareness of liver cancer and the intention to discuss it among health care providers in varying settings.[22,24] Collaboration between Pennsylvania, state agencies, universities, and community organizations shortened development time for focused interventions. This can be a model for other NCCCP programs to develop high-quality resources that may only require minor adjustments for specific populations.[22] Given that a majority of liver cancer interventions have been focused on HBV infection in Asian/Pacific Islander populations, the adoption of promising practices for liver cancer prevention could be broadened to other populations with high liver cancer incidence rates, such as AIAN and Hispanic communities.[23]

The resources NPAIHB developed through this project increased the availability of AIAN-focused sun safety materials. NPAIHB was able to develop resources that were evidence-based, tribe-focused, and contained vital information specifically for the AIAN community in the Pacific Northwest. These included the policy guide, patient education poster, and sun safety media campaign, which can be used to further strengthen and support community-led sun safety prevention activities. To ensure that the resources were culturally appropriate, they were reviewed by tribal youth, including the Northwest Tribal Youth Delegates to obtain critical feedback before dissemination. The skin cancer and sun safety policy guide developed by NPAIHB also supported evidence-based policy approaches for tribal communities across the United States due to its cultural competency and relevance for AIAN populations. This resource has the potential to be adapted by other tribal communities looking to reduce overexposure to UV. This may help address widespread disparities in health outcomes among AIAN populations.[51]

There were commonalities and differences between the 3 NCCCP programs. Iowa and Pennsylvania's interventions included virtual or remote trainings and offered CE credits as

incentives. Iowa and Pennsylvania also focused their interventions on health care providers. All 3 programs worked collaboratively with partners to accomplish their work and all sites were forced to shift priorities and resources due to the COVID pandemic. One key difference between the NCCCP was the local setting: NPAIHB operates in a tribal environment with a very different context from the other sites which required different strategies and program development.

There were several limitations to this project. The COVID-19 pandemic affected all aspects of the project. In Iowa, it was difficult to recruit health care clinics, especially those in rural areas, since the staff at many clinics were busy with COVID-19 patients and shifting priorities. Originally, Iowa planned to focus efforts on clinics in 2 specific rural zip codes with low HPV vaccination rates in the state. Iowa was also unable to determine how the intervention affected HPV vaccination because of COVID-related staff and resource limitations to track rates of vaccination in the participating clinics. NPAIHB faced COVID-related challenges related to the inability to conduct planned in-person outreach at social locations such as community centers and local markets. In addition, many tribes in the Northwest are in rural areas where Internet access is limited. Therefore, conducting Internet-based focus groups with youth and curriculum implementation proved challenging. Pennsylvania faced COVID-related internal delays in Department of Health processes (legal approvals, contracting, and procurement), and challenges collaborating with external partners, such as federally qualified health clinics and immunization coalitions, because of their focus on COVID-19 pandemic-related priorities. Dissemination and evaluation of the reach of public messaging regarding HBV and HCV vaccination and screening was also limited as public health resources were directed to COVID-19 activities during the pandemic. There were similar COVID-19–related limitations in evaluation in Iowa and NPAIHB. Moving forward, similar projects to scale up primary prevention cancer interventions among children may require more funding and resources to ensure that evaluation can be completed in the event of unexpected conditions. Additional TA may also be necessary to assist programs in implementing and scaling up evidence-based interventions.

Lessons learned

Notable lessons learned from this demonstration project include the importance of partnerships and flexibility. Partnerships were key to implementation of primary prevention interventions. For Iowa working with partners, including the American Cancer Society and the University of Iowa, facilitated implementation of the HPV vaccination intervention including recruitment of clinics and developing study materials. For Pennsylvania, key partnerships with the Pennsylvania DCNR and the Pennsylvania Cancer Coalition were critical for success and implementing their work across the state. Pennsylvania’s use of state- and county-specific melanoma data also made training relevant to engaged partners. In NPAIHB, partnerships with surrounding tribal communities ensured that resources and campaign materials were culturally and linguistically relevant. A key example of this was NPAIHB’s use of a local AIAN photographer to take culturally relevant photos for the media campaign. These photos were used to develop sun safety messaging and media products which were presented to the Northwest Tribal Youth Delegates for feedback before

dissemination. This ensured that the products and messages were tailored and culturally relevant to the tribes which NPAIHB serves. Engaging clinical partners was also key to programmatic success. Health care providers and clinical staff were engaged in Iowa and Pennsylvania through training webinars that offered CE credits. Offering CE credits may have helped with attendance and motivating health care provider engagement. Selection of clinical partners was also key to programmatic success. Statewide recruitment rather than geographic or other niche-based efforts may help future partnerships with clinical sites. Frequent communication and TA, including list serves with partners, facilitated open channels of communication and information distribution, and might help improve future partnerships. Flexibility was also a key factor in implementation for all the programs. Pivoting to develop and promote remote (as opposed to in-person) educational options, especially in the setting of COVID-19 and other competing priorities, was key to implementing cancer prevention interventions. With increasing remote learning options and research examining the effectiveness of remote learning, this will be an important area of study moving forward.[52] An exception to this may be the development of culturally relevant messages in AIAN communities as we found that in-person engagement with tribal community members is vital to this process.

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Implications for Policy & Practice

- An investment in training programs for cancer prevention topics such as sun safety and HPV vaccination, along with a well-defined curriculum and subject matter expert champion may lead to adaptable interventions applicable to a wide range of settings. Offering CE may help with engaging clinical providers.
- When developing education materials for cancer prevention, ensure they are culturally and linguistically relevant to populations. For example, translate materials in other languages when appropriate, include graphics and activities specific to the community, and ensure community review of materials.

TABLE 1

Primary Prevention Interventions Among Children for Iowa, NPAIHB, and Pennsylvania Comprehensive Cancer Control Programs

Strategy	Cancer Type	Program	Setting	Intervention	Activities	Partnerships	Target Audience	Evaluation	Outcomes
Provider education	Cervical	Iowa	11 clinics statewide	Train-the-trainer approach to increase human papillomavirus vaccination	Online and in-person webinar training with CME	Iowa HHS, American Cancer Society, University of Iowa, Des Moines University	Clinical and clerical staff	Pre/postsurvey, closeout interviews	Statistically significant increase in mean scores regarding perceptions about HPV vaccination, self-efficacy, and behavioral intentions
	Liver	Pennsylvania	Online training; state and county health centers; obstetrics practices	Brochures/rack cards and posters; online HBV and HCV continuing education training	Development and distribution of educational materials and online continuing education training	Pennsylvania Division of Immunizations; The Department of Epidemiology Viral Hepatitis Elimination Program	Clinical staff with a focus on obstetrics	Use of continuing education trainings, materials created and distributed	From March 1, 2022 to April 5, 2022, 27 providers completed the HCV training module, and 58 providers successfully completed the HBV training module
	Skin	Pennsylvania	Pennsylvania state parks and beaches	Sun safety in outdoor recreational settings	Training of park staff on sun-protective behaviors; sunscreen dispensers; educational posters	Pennsylvania DCNR and impact melanoma	Park staff	Post–sun safety training survey of park staff. Inclusion in Pennsylvania DCNR policy and plans	DCNR expanded sun safety program to 12 additional state parks. 90% of staff thought training was relevant to their work, 98% of staff correctly answered posttraining knowledge check, and 75% supported workplace policies aimed at protecting staff and visitors
Patient education	Liver	Pennsylvania	Statewide PENNIE health equity tours and fairs; YMCA	Patient education	Educational posters and brochures	Pennsylvania Division of Immunizations; The Department of Epidemiology Viral Hepatitis Elimination Program; YMCA	Consumers	Materials created and distributed	Distribution through PENNIE and YMCA in Pennsylvania
	Skin	NPAIHB	Tribes in NPAIHB jurisdiction	Multicomponent intervention	Policy guide; high school curriculum; media campaign; patient education materials	Local tribal partners	American Indian/Alaska Native youth from the Northwest	Reach of materials created and distributed	In May 2020, social media posts gained 40 unique engagements and had a total reach of 336
Policy development	Skin	NPAIHB	Tribes in NPAIHB jurisdiction	Development of policy guide	Policy guide with compendium of resources; worked with content experts from CDC,	CDC, Oregon Health and Science University, local tribes	Tribal schools and communities	Reach of materials created and distributed	Distribution to all 43 federally recognized tribes served by NPAIHB

Strategy	Cancer Type	Program	Setting	Intervention	Activities	Partnerships	Target Audience	Evaluation	Outcomes
					ICF, NPAIHB, and various local tribal communities				

Abbreviations: CDC, Centers for Disease Control and Prevention; CME, continuing medical education; DCNR, Department of Conservation and Natural Resources; HBV, hepatitis B virus; HCV, hepatitis C virus; HHS, Health and Human Services; NPAIHB, Northwest Portland Area Indian Health Board; HPV, human papillomavirus; PENNIE, Pennsylvania Health Exchange.

TABLE 2

Pretest and Posttest Mean Scores for Iowa Announcement Approach Webinar

Questions	Mean Scores[a,b]	
	Pretest (n = 41)	Posttest (n = 22)
Routinely recommending HPV vaccine is important to me.	4.5	4.6
I feel confident addressing parents' concerns about HPV vaccine.	3.9	4.3
I plan to routinely recommend HPV vaccine when patients turn 11 or 12 y.	4.4	4.7
Most parents think HPV vaccine is important for their 11- or 12-year-olds.	3.1	3.4

Abbreviation: HPV, human papillomavirus.

[a] $P < .05$ *in* t *test.*

[b] Participants scored their awareness, knowledge, ability, and intention by using a Likert-type scale from 1 to 5, with 5 being the highest score for each variable measured.

TABLE 3

Iowa Clinic Feedback on Implementation of Announcement Approach

Facilitators to Implementation	Barriers to Implementation	COVID-19 Challenges	Benefits of Participating in the Project	Suggestions for Improving Future Interventions
Attending the webinar to train staff	Lack of completion/patients not coming back for the second HPV dose	Closure of clinics during pandemic and people falling behind on non-COVID-19–related health care	Enhanced clinic education around HPV vaccination through the webinar/training	Sharing approach more widely in clinics
Having a physician champion in the clinic	Parent misinformation about HPV vaccination (parents often associated the HPV vaccine with sexual activity instead of cancer prevention)	Lack of consistent clinic reminders during COVID-19	More consistent messaging around HPV vaccination	More ongoing support, communication, and technical assistance
More consistent clinic messaging around HPV vaccination	HPV vaccine not being required in schools		Grant funding to focus on HPV vaccination	More support materials such as testimonials/personal stories of HPV-associated cancer survivors

Abbreviation: HPV, human papillomavirus.

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