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PROMOTE Pilot Study
Pharmacy multimodal communication strategy to promote HPV vaccination

Table of Contents

List of Abbreviations and Acronyms

FHCC	Fred Hutchinson Cancer Center
HICOR	Hutchinson Institute for Cancer Outcomes Research
HPV	Human papillomavirus
IOF	Implementation Outcomes Framework
IRB	Institution Review Board
TDF	Theoretical Domains Framework

1. Short Title
PROMOTE Pilot Study

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3. Executive Summary

Background & Significance	HPV vaccination of children ages 9-17 in Washington state is sub-optimal, particularly among underserved populations. Convenient and easy to access, pharmacies are promising vaccination settings that have potential to increase HPV vaccination rates. However, low parent awareness of services and poor engagement by pharmacy staff are significant barriers to wider implementation.
Objective:	This will be a mixed methods pilot intervention study exploring the use and development of a multimodal communication strategy to increase pharmacy-located HPV vaccination for adolescents. The multimodal strategy includes adapting an existing electronic "forecasting" system to identify vaccine eligible children who are due for vaccination and communication training for pharmacy staff to effectively recommend HPV vaccination. The study will involve the enrollment of parents/guardians with children between the ages of 9-17 and pharmacy staff at pharmacies in Western Washington state.
Methods	Aim 1: Conduct key informant interviews to inform/adapt an existing electronic forecasting system and behavioral counseling framework to match barriers and facilitators to HPV vaccination in pharmacies. Aim 2: Pilot and test the impact of an adapted multimodal communication strategy in pharmacies to support HPV vaccination.
Population:	Aim 1: Key informant interviews will be conducted with up to 12 parents/guardians of children aged 9-17 and up to 18 Bartell Drugs pharmacy staff members. Aim 2: Administer a pre/post implementation study questionnaire to all pharmacy staff in up to four independent pharmacies in Western Washington state and assess the adoption of the intervention based upon audits.
Sites:	Bartell Drugs and independent pharmacies in Western Washington state (independent pharmacies provided letters of support) located in the Cancer Consortium Catchment Area
Study Duration:	12 months

4. BACKGROUND INFORMATION AND RATIONALE

Background

Human papillomavirus (HPV) causes 34,800 new cancer cases in men and women each year in the US, over 90% of which could be prevented by HPV vaccine[1]. Despite national recommendations for HPV vaccination since 2006[2] the Centers for Disease Control and Prevention reports the percentage of US adolescents who are with HPV vaccination in 2018 is only 51%, well below the Healthy People 2020 goal of 80%[3]. Low vaccination rates are persistent in Washington State (including the Cancer Consortium's Catchment Area), with significant geographic variation in up-to-date coverage (Figure 1). The President's Cancer Panel[4] and the National Vaccine Advisory Committee[5] have recommended expanding HPV vaccination to pharmacies to capitalize on the "medical neighborhood" to increase vaccine access and coverage. Pharmacies are promising HPV vaccination settings: 89% of US residents live within 5 miles of a pharmacy[6]; 50 states and US territories allow pharmacists to administer HPV vaccine[7]; and pharmacists have a long history as vaccine providers[8], administering millions of doses of several types of vaccines every year[9]. Our previous national surveys showed parents are willing to have pharmacists administer HPV vaccine to their children[10-12] and primary care physicians are supportive of pharmacist-provided HPV vaccination[13]. Our analysis of demonstration projects in 5 states also showed that while pharmacy-located HPV vaccination was highly acceptable, there are significant barriers to wider implementation: low awareness for services among parents and poor engagement by pharmacy staff with adolescent vaccinations undermine HPV vaccine uptake in the pharmacy setting[14]. Our findings prompt the policy question: How can HPV vaccination be effectively implemented in pharmacies to help achieve the Healthy People 2020 goal? To date, no implementation research has methodically evaluated strategies that could support HPV vaccination in pharmacies.

Rationale

Our *long-term goal* is to increase HPV vaccination rates by strengthening existing capacity in pharmacy-located vaccination. *The objective of this CCSG catchment area pilot* is to adapt and test a multimodal communication strategy that can mitigate barriers pharmacies face in communicating about HPV vaccination with parents and patients. The strategy will consist of two evidence-based communication approaches: 1) *Electronic forecasting* to identify vaccine-eligible children[15]; and 2) Pharmacy staff using *the 5A's (Ask, Advice, Assess, Assist, and Arrange) Behavioral Counseling Framework* to recommend HPV and other vaccines. Electronic forecasting allows pharmacy staff to proactively check which of their patients are eligible for vaccines. A study lead by Dr. Bacci found that proactive prompting improved pharmacy staff engagement with vaccination services, resulting in a 15% increase in adult vaccinations at Bartell Drugs, a regional pharmacy chain in Western Washington.[15] Although the forecasting system improved staff engagement, vaccination rates may have been further improved linking the electronic forecasting with communication training on how to effectively communicate about vaccines with patients. The 5A's Framework is a behavioral counseling approach endorsed by the United States Preventive Services Task[16] and has been effectively used in smoking cessation and physical activity interventions for two decades. The framework provides an easy rubric for clinicians to evaluate and engage patients' readiness and intentions for behavior change. Training clinical staff to use the 5A's has been successful for behaviorally intensive interventions, so it would be reasonable to believe that it could be used to motivate HPV vaccination. Dr. Shah recently lead a study, published in *Pediatrics*, that identified effective HPV vaccine message characteristics[17] that could be applied to the 5A's. The two communication approaches would work together by preempting pharmacy staff to proactively engage adolescents/their parents with vaccinations and teach pharmacy staff how to effectively communicate about HPV vaccination. However, these communication approaches have not been used in pharmacies to improve HPV vaccination.

5. SPECIFIC AIMS

Aim 1: Adapt an existing electronic forecasting system and behavioral counseling framework to match barriers and facilitators to HPV vaccination in pharmacies. Guided by the *Theoretical Domains Framework (TDF)*[20], we will conduct in-depth interviews with pharmacy staff (*n*=18) and parents or guardians of children aged 9-17 (*n*=12) to identify factors that impede or promote parent and patient engagement with pharmacy-located vaccination services.

Aim 2: Test the impact of an adapted multimodal communication strategy in pharmacies to support HPV vaccination. We will deliver a communication strategy training to pharmacy staff at predetermined pharmacy sites within Western Washington. We will assess pharmacy staff's experiences with the multimodal communication strategy and delivering HPV vaccination at baseline and post-implementation, measuring outcomes selected from Proctor's *Implementation Outcomes Framework (IOF)*.[21] We will also develop an environmental scan[25] to characterize a pharmacy's environment, vaccination workflow, and team dynamics. The findings will be used to adapt the pharmacy's workflow to better use the currently available forecasting system and tailor a vaccine communication training for pharmacy staff based on the 5A's.

6. STUDY DESIGN AND DATA MANAGEMENT

6.1 Study design

This is a *mixed methods pilot study* aimed at improving the dissemination and implementation of adolescent vaccination services in community pharmacies, particularly HPV vaccination. These services are readily available in all pharmacies in Washington state, and, as such, this protocol is largely focused on quality improvement of vaccination services.

Aim 1. This aim will use qualitative approaches to identify facilitators and barriers of behavioral determinants related to the adolescent vaccine communication and delivery in community pharmacies, with an emphasis on HPV vaccination. The activities of this aim will include 1) Conducting cognitive testing with a convenience sample of non-participants to get feedback on our interview questions to ensure that they are understandable as intended. No personal information or data will be collected during this phase; 2) Conducting key informant interviews with Parents/Guardians and Pharmacy staff using semi-structured interview techniques and environmental scans. Interviews will be guided using the TDF. The TDF provides a sound theoretical foundation for our inquiry into barriers/facilitators of HPV vaccination in pharmacies, as it provides a comprehensive framework of behavioral determinants that impact how well individuals like a pharmacist can adopt and integrate an evidence-based practice like HPV vaccination. The TDF constructs we initially include in the guide will be informed by our previous research on HPV vaccination in pharmacies[26-28] and our other implementation research in pharmacies.[29, 30]

Aim 1 outcomes. Qualitative information will be used to evaluate how well the proposed communication strategy matches barriers and facilitators to HPV vaccination in pharmacies for both parents/guardians and pharmacy staff. The activities of this aim will result in findings that will be used to adapt the existing forecasting system in pharmacies to identify vaccine-eligible children and develop a vaccine communication training for pharmacy staff.

Aim 2. This aim will use quantitative approaches to evaluate the feasibility and impact of the communication strategies developed in Aim 1 on adolescent vaccination rates in pharmacies, emphasizing HPV vaccination. We will use a pre/posttest quasi-experimental design to evaluate the change in vaccination rates at selected pharmacy sites after implementation of the multimodal communication strategy, as well as changes in perceptions and behavioral predictors of pharmacy staff. We will also develop an environmental scan[25] to characterize a pharmacy's environment, vaccination workflow, and team dynamics. Conducting environmental scans of pharmacies will further contextualize barriers/facilitators to HPV vaccination.[31]

Aim 2 outcomes. Quantitative information will be collected through the use of online surveys at baseline and follow-up. Surveys will assess the *acceptability, appropriateness,* and *feasibility* of the proposed communication strategy to support HPV vaccination and other adolescent vaccinations. Additionally, pharmacy audits will be conducted from the pharmacy electronic records to assess *adoption* of HPV vaccination, measured as the average HPV vaccination rate per pharmacist at each pharmacy. We will also assess the impact of the communication strategy on *adoption* of other adolescent vaccines (e.g., tetanus, diphtheria, acellular pertussis; meningoccocal conjugate; influenza).

6.2 Study area description
The catchment area includes independent pharmacies in Western Washington state.

6.3 Study population
This study will include:

6.3.1 Inclusion and exclusion criteria

	Aim 1	**Aim 2**
Group	Parents/Guardians Pharmacy staff	Independent pharmacies in Western Washington state
Number targeted	Parents/Guardians: Up to 12 Pharmacy staff: Up to 18 (9 pharmacists, 9 pharmacy technicians)	Up to 4 sites All pharmacy staff at participating sites (up to 25 staff members)
Age restriction	≥18 years	≥18 years
Inclusion	Parent/Guardians - Individuals with children between the ages of 9-17 in their care who are English speakers, live in Washington state, and have access to a telephone or computer with internet access (up to 12 parents) Pharmacy staff - Employed at a Western Washington Bartell Drugs pharmacy sites and have access to a telephone or computer with internet access	Pharmacy staff employed at up to four independent pharmacies in Western Washington who speak English and have access to a computer with internet access
Exclusion	Pharmacy staff: Floaters/per diem. Those who object to having their interview audio recorded. Parents/Guardians: Those who object to having their interview audio recorded.	

6.3.2 Representation of women, children and minorities
All parents/guardians, pharmacy technicians and pharmacists will be eligible to participate in this study regardless of sex/gender and race/ethnicity. Since the research will be conducted in community pharmacies in Washington state, majority (>60%) participants are expected to be White/Caucasian, which is typical of the population in Washington state. We expect roughly equal numbers of male and female participants across all populations. Pharmacy staff recruited into the study will likely be 60% female based on current demographics of this professional workforce in Washington state.

6.3.3 Co-enrollment guidelines
There are no restrictions on co-enrollment for aims 1 & 2.

6.4 Sample size considerations and sampling strategy
Aim 1: Purposive sampling will be used to identify potential parent/guardian study participants. Purposive sampling from participating pharmacies will be used to identify pharmacy staff. Since the research components

of this aim are entirely qualitative in nature, no power calculation is required. Based on previous research studies with parents/guardians and pharmacy staff, we believe that the proposed sample sizes for Aim 1 will allow us to capture a diverse range of viewpoints and to achieve thematic saturation, where no new information is gained by additional interviewing. Sample sizes were determined based on qualitative literature that indicate that thematic saturation can be achieved with as few as 12 participants.

Aim 2: Purposive sampling of independent pharmacies in Western Washington state. As this is a pilot study aimed at understanding the feasibility, appropriateness, and potential impact of a multimodal communication strategy, a power calculation is not necessary for Aim 2. Additionally, this study is purposively designed to be of limited scope based on the Fred Hutch/UW Cancer Consortium expectations for CCSG pilot project. Our planned future study to conduct a large scale implementation trial will have resources available to hire a biostatistician who can support the study team in trial design and conducting power calculations/appropriate statistical analyses.

Definition of cases and controls: Not applicable

6.5 Recruitment, screening, consent and enrollment procedures

6.5.1 Aim 1

6.5.1.A Participant recruitment for cognitive testing the interview guides
We will use convenience sampling to identify participants for cognitive testing the interview guides. The convenience sample will include family and friends who have children aged 9-17 and pharmacy staff known by the research team. *These individuals will not be participating in research.* They will be providing feedback on interview guides to improve interview questions and to ensure interview questions are understood as the research team intended.

6.5.1.B Parents/Guardians with children ages 9-17
Recruitment & screening: We will use both in-person and online recruitment. Parents will be approached during Health Fairs and community events by community health educators employed at the Fred Hutch Office of Community Outreach and Engagement. Approached participants will receive a flyer that provides an overview of the study, what their participation will entail for the key informant interview, and the incentive they will receive upon completion. Additionally, we will recruit parents online through social media platforms such as the Fred Hutch Facebook page and provide similar details about the study as with our in-person recruitment method. Interested parents will contact study staff by email or phone. The study staff will provide interested participants with additional study information and schedule them for a key informant interview that will be conducted either by phone or in-person (if permitted). If the participant is interested in participating, study staff will obtain contact information for participants to schedule key informant interview appointments. A waiver of documentation of written consent will be obtained prior to the beginning of the project for those who are not consented in person.

Enrollment: Interested parent/guardian participants will complete a demographic survey (approximately 10 minutes to complete) and participate in a key informant interview either in-person or over the phone.

List of procedures for all parent/guardian participants – Online recruitment

a. Participants interested in participating in key informant interviews will click on the Fred Hutch Facebook recruitment ad which will send them to a secure online form set up by Fred Hutch's Communication and Marketing team. This form will provide information about the study and fields to enter their contact information if they wish to participate in key informant interviews.
b. Study staff will contact participants by email or phone and provide additional information about the study and answer any questions.
c. Study staff will schedule key informant interviews with interested participants and provide them with an option to conduct the interview in-person (subject to appropriate social distancing procedures) or by telephone.

d. During the interview time, study staff with go over the informed consent process with participants and obtain their verbal consent which will be documented by the study staff.
e. During the interview time, study staff will conduct the 90-minute key informant interview and demographic survey.

List of procedures for all parent/guardian participants – In-person recruitment (subject to appropriate social distancing procedures)

a. We will work with the Fred Hutch Office of Community Outreach and Engagement (OCOE). OCOE community health educators will approach parents at health fairs and community events. They will provide information about the study through a recruitment flyer. This flyer with have instructions for how parents can contact study staff (e.g., study email and phone number) if they wish to participate in key informant interviews.
b. Study staff will contact participants by email or phone and provide additional information about the study.
c. Study staff will schedule key informant interviews with interested participants and provide them with an option to conduct the interview in-person (subject to appropriate social distancing procedures), by telephone, or by approved video conferencing platforms that are HIPAA compliant.
d. During the interview time, study staff with go over the informed consent process with participants and obtain their verbal consent which will be documented by the study staff.
e. During the interview time, study staff will conduct the 90-minute key informant interview and demographic survey.

6.5.1.C Pharmacy Staff

Recruitment & screening: Christina Ree, Director of Clinical Programs, will approach Bartell's pharmacy staff to inquire about their interest in participating in the key informant interview portion of the study. Interested participants will reach out to study staff, who will further explain the study and obtain contact information for participants and schedule key informant interview appointments. A waiver of documentation of consent will be obtained prior to the beginning of the project; thus, written consent will not be provided.

Enrollment: Interested pharmacy staff will participate in a key informant interview either in-person or over the phone and complete a demographic survey at the end of the interview.

List of procedures for all pharmacy staff participants

a. Study staff will provide a recruitment flyer for pharmacy staff to Christina Ree, Director of Clinical Programs, at Bartell Drugs. The recruitment flyer will contain pertinent study information and instructions for how pharmacy staff can contact study staff (e.g., study email and phone number) if they wish to participate in key informant interviews.
b. Christina Ree will approach Bartell's pharmacy staff (in-person, by telephone, or email) to inquire about their interest in participating in the key informant interviews and ask them to contact the study staff if interested.
c. Study staff will contact participants by email or phone and provide additional information about the study.
d. Study staff will schedule a 90- minute key informant interview with interested participants and provide them with an option to conduct the interview in-person (subject to appropriate social distancing procedures), by telephone, or by approved video conferencing platforms that are HIPAA compliant.
e. During the interview time, study staff with go over the informed consent process with participants and obtain their verbal consent which will be documented by the study staff.
f. During the interview time, study staff will conduct the 90- minute key informant interview and demographic survey.

6.5.2 Aim 2

6.5.2.A Participant recruitment for cognitive testing the survey questions

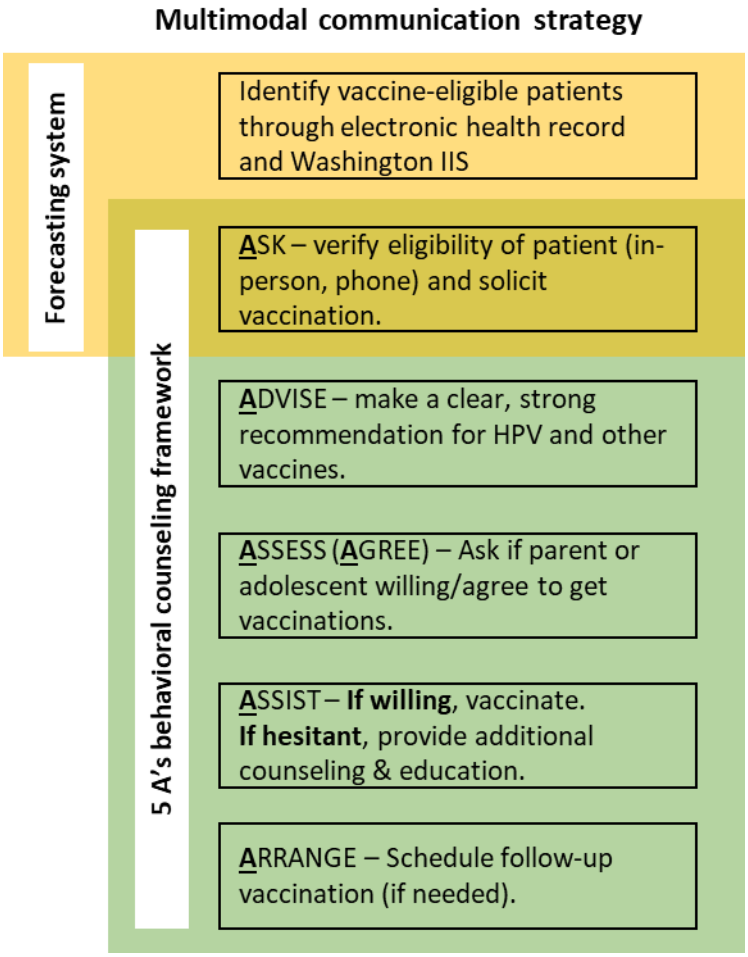
We will use convenience sampling to identify participants for cognitive testing the survey questions. The convenience sample will include family and friends who are pharmacy staff known by the research team. *These individuals will not be participating in research.* They will be providing feedback on survey questions to improve survey items and to ensure survey items are understood as the research team intended.

6.5.2.B Pharmacy Staff

Recruitment & screening: Mylinh Nguyen, Director of Practice Development for the Washington State Pharmacy Association (WSPA), will introduce study information to independent pharmacy owners in Western Washington state. Pharmacy owners who are interested in participating in the study must manage/operate an independently-owned community pharmacy. Pharmacy owners will contact the study team. Pharmacy owners will provide documented confirmation of their pharmacy site's agreement of participation in the communication intervention. We will select 2 to 4 independently-owned community pharmacies with similar patient case load, demographic and community characteristics to control for internal threats to intervention validity and confounding. A waiver of written consent for the pharmacy sites will be obtained prior to the beginning of the project; thus, no written consent will be provided.

Enrollment: Once pharmacies have been enrolled into the pilot, pharmacy staff will be asked to complete a pre-implementation online survey (i.e., pretest; 10-15 minutes to complete) via a survey link to assess the *acceptability, appropriateness,* and *feasibility* of providing HPV vaccination to children aged 9-17 in their pharmacies. They will be asked to attend training on the new communication strategy and employ the new communication strategy for HPV vaccinations for up to 6 months.
Once the pilot is complete, pharmacy staff will again be asked to complete a post-implementation survey (i.e., post test) in the same fashion as the pre-implementation survey.

Description of communication strategy intervention: The communication intervention will be planned to be no more than 120 minutes (target time 90 minutes). The strategy will consist of two evidence-based communication approaches: 1) *Electronic forecasting* to identify vaccine-eligible children; and 2) Pharmacy staff using *the 5A's (Ask, Advice, Assess, Assist, and Arrange) Behavioral Counseling Framework* to recommend HPV and other vaccines. Electronic forecasting allows pharmacy staff to proactively check which of their patients are eligible for vaccines. The 5A's Framework is a behavioral counseling approach endorsed by the United States Preventive Services Task and provides an easy rubric for clinicians to evaluate and engage patients' readiness and intentions for behavior change. The two communication approaches would work together by preempting pharmacy staff to proactively engage adolescents/their parents with vaccinations and teach pharmacy staff how to effectively communicate about HPV vaccination. This strategy capitalizes on existing vaccination systems in pharmacies and interpersonal communication training pharmacy staff will be familiar with using with patients.



The communication training will consist of 5 parts delivered during the session:

1) An educational overview of adolescent vaccination, with an emphasis on HPV vaccination
2) Overview of the communication strategy
3) Process for integrating the communication strategy into clinical workflow at the pharmacy
4) Training on communication strategy
5) Pharmacy staff practice with the communication strategy

List of procedures for pharmacy staff

a. Mylinh Nguyen, Director of Practice Development for the Washington State Pharmacy Association (WSPA) will invite independent Western Washington pharmacies to participate in the pilot study
b. Pharmacy staff at enrolled sites will provide a waiver of written consent to the study team prior to the intervention. Waiver will be provided before completing the pre-implementation survey.
c. Enrolled pharmacies will ask pharmacy staff to consent to the study and complete the pre-implementation survey
d. Pharmacy staff will complete the 2-part vaccine communication strategy training (2 sessions, 60 minutes each)
    i. The first session will be online provided as pre-recorded continuing education provided through the Washington State Pharmacy Association (WSPA). This session will be used to teach the vaccine communication strategy.
    ii. 4-6 weeks later, the second session will be live, in person or conducted online using Zoom, and will also count as CE administered through WSPA. This session will be used to answer any follow-up questions about the training, garner feedback on how the pharmacy staff has been using the vaccine communication strategy, and retrain on any components of the strategy.
e. The enrolled pharmacies will partake in the communication intervention pilot for up to six months.
f. After pilot completion, pharmacy staff will be asked to complete the post-implementation survey

List of procedures to conduct environmental scan of pharmacy (subject to appropriate social distancing procedures)

a. Study staff will contact the owners of each pharmacy to schedule a time to visit the pharmacies where pharmacy staff who participated in the Aim 2 intervention work.
b. Under the supervision of the pharmacy managers (in compliance with pharmacy policies and procedures), study staff will be granted permission to enter the pharmacies and conduct the environmental scan.
c. The study staff member will observe the pharmacy staff and make note of the environment (e.g., workflow set up, features of the pharmacy, medical services provided, etc.) and complete the environmental scan. The scan is designed to avoid disturbing or contacting pharmacy staff while they are working. No personal identification of staff members will be collected during this observation. Study team members completing the environmental scans will be compliant with local jurisdictions' policies and procedures with wearing personal protective equipment (PPE) to reduce risk of coronavirus exposure as needed.

6.6 Compensation for study participation

Participant Incentives. Compensation of $50 (as a check, cash, or gift card) will be provided to parents/guardians and pharmacy staff for completing the Aim 1 key informant interviews. Compensation totaling $40, in the form of cash, will be provided to pharmacy staff for completing the Aim 2 pre- and post-intervention surveys.

Pharmacy Incentives. Compensation of $1,000 (as a check) will be given to each participating pharmacy in the Aim 2 pilot intervention.

6.7 End of study/final contact

Aim 1: Parent/guardian and pharmacy staff participants will exit the study after completing their key informant interview.

Aim 2: Pharmacies will exit the study once their pharmacy staff have completed the post-implementation survey (i.e., post test, 10-15 minutes to complete) . This post survey will be administered up to 5 months after the communication strategy intervention has been delivered to the pharmacy sites. The data management team from the participating Western Washington independent pharmacies will conduct an audit of the pharmacy sites' vaccination data and send it to the study team for data analysis using a secure data transfer method approved by the independent pharmacy and Fred Hutch.

6.8 Participant retention

For Aim 1, participants who do not present for the key informant interview will be called using contact information obtained at enrollment. A participant will be considered lost to follow up (LTFU) after 5 attempts have been made to contact them on 5 separate occasions without successful rescheduling of an interview. Aim 2's retention is based upon pharmacy contractual agreement to participate in the pilot. Therefore, retention is not applicable.

6.9 Participant withdrawal

Participants may voluntarily withdraw from the study for any reason at any time. The PI and research team may also withdraw participants from the study in order to protect their safety.

7. Data Management

7.1 Key informant interview audio recordings and transcripts

An interview Excel tracking file with study ID numbers will be used and kept by the project coordinator in a password protected server at Fred Hutch and accessible only to the PI and authorized staff. Participants will be assigned a study ID number to track their interview audio data and transcript.

Procedure for audio recordings and transcriptions

a. One day before the interview, the interviewer will ensure that the recorder is fully operational and that the batteries are charged.
b. Prior to the start of the interview, the interviewer will test the recorder to ensure that the audio is being well captured.
c. At the end of the interview, the research staff will play the recording in a private office or room to ensure that the discussion was well captured.
d. After ensuring the interview was well captured, the interviewer will download the recordings into a Fred Hutch study folder on a secured server.
e. After the download is done and confirmed, the file in the audio recorder will be deleted.
f. The interviewer will then hand over the audio recording device to Fred Hutch staff for safekeeping after all the interviews have been completed.
g. Audio Files will be labeled:

Parent interviews	Parent_*ParticipantNumber_Date* Example: Parent_009_2020.05.07
Pharmacy staff interviews	Pharm_ *ParticipantNumber_Date* Example: Pharm_009_2020.05.07

a) The audio files will then be uploaded to GMR Transcription to produce a verbatim transcription.
b) Audio files and transcriptions will be stored on a password protected server at Fred Hutch that only study staff have access to.

7.2 Demographic survey

The demographic survey will be completed at the time of the key informant interview is conducted. Once the interview is completed, study staff will ask participants about the demographics (e.g., age, sex/gender, race/ethnicity, etc.) using the questionnaire developed for the survey. The answers will be recorded on a paper survey with the participants' study ID as described in section 7. 1 above. Study staff will enter the data in an electronic database created in either REDCap or Qualtrics. This database will be stored securely on Fred Hutch servers in a password protected folder only accessible by authorized study staff. Paper copies of the demographic survey will be stored in a study folder in either the PI or study coordinator's office at Fred Hutch in a locked file cabinet. Demographic data will also be collected as part of the Aim 2 online surveys mentioned in 7.4 below.

7.3 Environmental scan

The environmental scans will be completed by study staff during their observation of the pharmacy under the supervision of the pharmacy owner or their delegate. Study staff will complete the scan using paper copies. The data collected will be entered into an electronic database created in either REDCap or Qualtrics. This database will be stored securely on Fred Hutch servers in a password protected folder only accessible by authorized study staff. Paper copies of the demographic survey will be stored in a study folder in either the PI or study coordinator's office at Fred Hutch in a locked file cabinet.

7.4 Pre- and post-implementation survey.

Surveys will be administered online through REDCap or Qualtrics. Participants will be assigned a unique ID to identify their pre- and post-implementation survey responses. These individuals will receive a survey link sent by the study team that will give them secure access to complete the online questionnaire. Survey data will be stored on a password protected server at Fred Hutch. Access to data identifying individual subjects will be restricted to investigators and staff directly involved in the study, all of whom have completed human subjects and standard data confidentiality training.

7.5 Vaccination audit data from the Independent Pharmacies.

The study team will establish a data use agreement with the independently pharmacies for the secure transfer and management of patient vaccination data from pharmacy sites participating in the pilot intervention. The agreement will describe variables to be included, data format, and data management. Data shall consist of the following for each patient aged 9-17 receiving vaccinations at the pilot sites: Age, sex/gender, race/ethnicity (if captured), insurance status, vaccine type, pharmacy where the patient was immunized, pharmacist who immunized the patient (using a unique code assigned to each pharmacist).

7.6 FHCC infrastructure that will secure data files.

The database management is built with multiple layers of security and the center practices appropriate due diligence to ensure the data is maintained in an appropriate manner. The file and database servers at FHCC are housed in a dedicated computer machine room containing emergency backup power, a UPS, a back-up power generator, a non-liquid fire suppression system, and authorization-based limited access. In addition to personal workstations, administrative access to databases and corresponding data will be limited to Virtual Private Network (VPN) and/or Terminal Server access. Furthermore, all databases will reside behind a redundant firewall system and intrusion prevention system.

A copy of the data will be stored in an Amazon Web Services (AWS) VPC. This account is covered by a Business Associates Agreement (BAA) signed by Fred Hutch and Amazon Web Services. The data will be transferred to this secure location via an IPsec VPN tunnel between the Fred Hutch Data Center and the AWS VPC. While stored in the VPC, all data will be encrypted at rest using custom encryption keys managed with AWS Key Management Service. All transport between authorized AWS services including AWS EC2 and AWS S3 will be over secure TLS connections. Any processing of the data will be performed using dedicated EC2 instances to ensure compliance. All access to the AWS Environment is controlled via Security Groups and Network Access Control Lists and audited to ensure no unauthorized access occurs.

The electronic data files for this study will be processed on this dedicated, layered-security system. Access to data identifying individual subjects will be restricted to investigators and staff directly involved in the study, all of whom have completed standard data confidentiality training. Data will be accessed by the study team exclusively using encrypted desktop computers. Per institutional standards, all desktops connecting to Fred Hutch networks must be baselined by Center IT to ensure adequate encryption, password protections, and configuration for the network to recognize an approved device. Unauthorized users do not have access to areas of the network which contain sensitive data, including PHI. All paper records and forms will be stored in locked drawers when not in use. Access to computer records will be strictly controlled and will require simultaneous knowledge of the database structure, database language, and multiple passwords. Since the system is behind a firewall and is accessible only to study staff, the risk of unlawful penetration is not a significant data safeguard concern.

7.7 Policies and procedures regarding the physical possession and storage of data files.

Access to data identifying individual subjects will be restricted to investigators and staff directly involved in the study, all of whom have completed standard data confidentiality training. All hard and soft copies of the data with identifiable information will be stored in locked drawers when not in use. Physical media that are received from the distributer or any physical copies of the data will be encrypted while at rest and will be held in a locked cabinet within the user's office. All paper records and forms will be stored in locked drawers when not in use. Secure pulping will be used on any printed material containing individual identifiers

In order to access data, all individuals on the study team must have completed FHCC's Confidentiality Training for Investigators and Research Staff and will have to apply for access according to the Center's Information Security Policy by submitting a CIT Data Services Data Request Form. The granting of access is contingent upon agreement to these security policies, which dictate responsible data usage and the loss of use privileges if violated.

7.8 Data destruction

Study records will be destroyed 7 years after the study IRB file is closed per Fred Hutch data destruction guidelines.
The Aim 2 limited data set from the independent pharmacies, showing vaccination rates, will be destroyed after the study manuscript is published.

Data stored on:	***Will be destroyed by:***
Server or workstation hard disks, or Removable media (e.g. floppies, USB flash drives, portable hard disks) excluding optical discs	Using a "wipe" utility which will overwrite the Data at least three (3) times using either random or single character data, or Degaussing sufficiently to ensure that the Data cannot be reconstructed, or Physically destroying the disk
Paper documents with sensitive or Confidential Information.	Recycling through a contracted firm provided the contract with the recycler assures that the confidentiality of Data will be protected.
Paper documents containing Confidential Information requiring special handling (e.g. protected health information)	On-site shredding, pulping, or incineration

7.9 Endpoints and variables
Aim 1: Qualitative information will be used to evaluate how well the proposed communication strategy matches barriers and facilitators to HPV vaccination in pharmacies for both parents/guardians and pharmacy staff. See interview question guides for the interview content.

Aim 2: Quantitative information will be collected to assess the *acceptability, appropriateness,* and *feasibility* of the proposed communication strategy to support HPV vaccination. See the Pre and Post Implementation Survey. Pharmacy audits will be conducted from the pharmacy electronic records to assess *adoption* of HPV vaccination, measured as the average HPV vaccination rate per pharmacist at each pharmacy. We will also assess the impact of the communication strategy on *adoption* of other adolescent vaccines (e.g., tetanus, diphtheria, acellular pertussis; meningoccocal conjugate; influenza).

8. Data collection procedures & data management of study records

8.1 Case Report Forms (CRFs):
Enrollment & Demographic Survey Information
Data collection instruments will be developed by the research team. Surveys and outcomes from in-depth interviews will be collected by study staff. Survey data will be collected electronically using REDCap. Compared to paper data collection, electronic data collection has the potential to be more secure, in that all data will be password protected from the moment of data collection. Data will be uploaded directly to the study's secure server from REDCap. The secure server that warehouses data will be password protected and accessible only to study personnel directly involved in data cleaning and analysis. We will plan to use wireless internet to send digital data. To protect the data, the website to which data will be uploaded will use existing well-known SSL/TLS (Secure Socket Layer/Transport Layer Security), as indicated by "HTTPS" in the URL. SSL/TLS is used by sites such as Google to protect data. All digital data will be sent and received using HTTPS.

8.2 Record Storage: PI and study team will maintain, and store in a secure manner, complete, accurate, and current study records throughout the study. The investigator will retain all study records for at least seven years after completion of the study. Study records include administrative documentation and regulatory documentation as well as documentation related to each participant screened and enrolled in the study, including informed consent forms, contact information forms and case report forms from all visits during the study.

8.3 Data analysis

For both Aim 1 & Aim 2:

Aim 1: Using community-based sampling in collaboration with the Fred Hutch Office of Community Engagement and Outreach, we will conduct audio-recorded, semi-structured interviews with parents of children aged 9-17 (up to *n*=12) and Bartell Drugs pharmacy staff (up to *n*=18; 9 pharmacists, 9 pharmacy technicians) to evaluate how well our proposed communication strategy match barriers and facilitators to HPV vaccination in pharmacies. Interview guides will be informed by the TDF[20], a widely used theoretical framework to understand behavioral determinants to successfully implement health promotion programs. Interviews will be about 90 minutes and qualitative data will be analyzed using framework-guided rapid analyses described by Gale et al.[22] The qualitative data will be used to adapt the pharmacy staff's workflow to improve their use of the electronic forecasting system and develop a tailored vaccine communication training based on the 5A's. Adaptations made to the communication strategy will be methodically documented using Stirman's *Taxonomy of Adaptation Characteristics*[23].

Aim 2: We will evaluate the impact of the communication strategy using a pre/post implementation study design in independent pharmacies located in Western Washington state. This design is commonly used in exploratory/development studies. The communication strategy will be delivered at the pharmacy study sites by study staff members. We will use the IOF[21] which identifies distinct implementation outcomes widely used to determine how successful implementation of an evidence-based practice, like HPV vaccination, was in a specified setting, like pharmacies. We will use validated survey measures to assess pharmacy staff's report of the *acceptability*, *appropriateness*, and *feasibility* of the communication strategy to support HPV vaccination.[24] We will also conduct audits of the pharmacy electronic records to assess *adoption* of HPV vaccination, measured as the average HPV vaccination rate per pharmacist at each pharmacy. We will also assess the impact of the communication strategy on *adoption* of other adolescent vaccines using pre-post data analysis methods like Wilcoxon signed-rank test or other nonparametric tests appropriate for small sample statistics.

9. Training procedures and quality assurance

Study PI will supervise training of study staff and clinic/pharmacy staff in study procedures, including recruitment, enrollment, conduct of the interviews, and maintenance of confidentiality and privacy. Specific expertise in the conduct of qualitative research will be provided by our team's qualitative expert, who has conducted qualitative research in numerous settings. All staff have been or will be trained in the responsible conduct of human subjects' research (NIH or CITI courses).

Clinical care: No clinical care will be provided by study staff.

Adherence to protocol: For Aim 1, bi-weekly reporting of enrollment will enable us to monitor if the study is running according to approved protocols. Frequent reporting will also enable us to quickly respond to any problems that may arise during the study.

For Aim 2, we will rely on periodic reporting from the independent pharmacies who will audit their pharmacy records and report their vaccination rates. Periodic reporting will occur at baseline (Month 0) and at least 1 follow-up time point after implementation of the communication strategy (Month 2).

10. Data and Safety Monitoring Plan

All members of the research staff and the personnel employed by the community-based organization will be trained in responsible conduct of research, including enrollment of human subjects, by Dr. Shah and the research recruitment training offered by the Fred Hutchinson Cancer Center.

To protect against the risk of loss of confidentiality, only Dr. Shah and the Project Coordinator will have access to identifiable information or the study database. The study database will be password-protected and housed on a secure server at the Fred Hutch. Immediately after the semi-structured in-depth interviews data will be collected, the Project Coordinator will transport the data to locked offices at the Fred Hutch. Survey data will be

collected via a secure online survey platform. Survey data will be kept in a secured cabinet under lock and key in the locked office at the Fred Hutch. For analysis, identifiable information will be removed from the datasets and participants will be assigned a unique study identifier. Audiotaped data from the semi-structured interviews will be transcribed and kept on a password-protected server. The participants will be encouraged to use a pseudonym during the semi-structured interviews, and the transcripts will identify each participant by their pseudonym.

11. Ethical considerations

11.1 Consent explanation

The relevant consents include the following information:

- Title
- Researchers' contact information
- Introduction
- Purpose of the study
- Procedures
- Risks, stress, or discomfort
- Alternatives to taking part in this study
- Benefits of being in the study
- Funding
- Confidentiality
- Fred Hutchinson HSD contact information
- Study participant statement
- Study participant signature page

11.2 Institutional Review Board

The study will be reviewed by the Institutional Review Board (IRB) at Fred Hutchinson Cancer Center. The study will not recruit subjects prior to approval from the Fred Hutchinson Cancer Center IRB.

11.3 Risks to subjects

The primary risk of participation in the study is the loss of confidentiality. Although study staff will take all necessary precautions to protect confidential data, it is possible that participants' involvement in the research could be discovered by a third party. Employment of pharmacy staff will not be affected if staff either wish or do not wish to participate in this study.

*In-Depth Interviews: S*ome questions may be sensitive or cause embarrassment to participants. Participants will be informed they can withdraw at any time and do not have to answer any questions if they do not want to.

Surveys/Questionnaires: Questions may cause emotional stress or embarrassment. The surveys have been designed in such a way as to minimize questions implying blame or judgment. Participants will be informed and reminded periodically that they can refuse to answer any question or stop the survey at any time.

Study staff will attend training sessions by the study investigators and receive ongoing supervision in areas related to ethical conduct, confidentiality protection, and other topics of human subject's protection. We will ensure that study staff are trained to clearly explain the purpose of the study to obtain informed consent and inform respondents about their rights and benefits without coercion to participate. We will also ensure that our interviewers inform the potential respondents about the confidentiality measures put in place to protect their privacy.

11.4 Potential benefits of the proposed research to the subjects and others
While there are no direct benefits to the participants for their involvement in this study; the information obtained from this study will be used to inform refinement and implementation of pharmacy-located HPV vaccination programs; such interventions are expected to increase coverage of HPV vaccination rates and benefit a child's future adult health and survival.

11.5 Alternatives to participation
There are no noted alternatives to participating in this study.

11.6 Study discontinuation
This study may be discontinued at any time by the Protocol Chairs, regulatory authorities, or the relevant IRB.

12. Study dissemination plan
Use of Information and Publications
The PI and research team intend to submit final findings to peer-reviewed journal manuscripts and present findings at local, national, and international conferences.

13. Study Limitations and how to minimize them
With this study being conducted only in Washington state, the results may not be generalizable to the rest of the country. Were the findings of this study to generate further interest in scaling up of pharmacy-located HPV education and vaccinations, further research would need to be done.

14. Study Timeline

CCSG PROMOTE Pilot Study Activities Timeline																
	Study Month															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Draft IRB App																
Draft Study Documents																
Submit to SRC for Approval																
Submit to IRB for Approval																
Cognitive testing																
Key Informant Inteviews																
Rapid Analysis																
Develop Communication Strategy																
Pre-implementation Survey																
Deliver Communication Strategy																
Data Collection/Evaluation																
Post Intervention Survey																
Study Closure																
Green is pre-IRB approval period																
Blue is post-IRB approval period																

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