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HPV vaccine communication training in healthcare systems: Evaluating a train-the-trainer model

Noel T. Brewer [a,b,*], Chloe G. Mitchell [a], Susan Alton Dailey [a], Liddy Hora [c], Marcie Fisher-Borne [c], Kim Tichy [d], Timothy McCoy [e]

[a] Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, United States
[b] Lineberger Comprehensive Cancer Center, University of North Carolina, United States
[c] American Cancer Society, United States
[d] Iowa Immunization Program, Iowa Department of Public Health, United States
[e] MercyOne Medical Group-Central Iowa, United States

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ABSTRACT

Background: Large healthcare systems provide an opportunity to disseminate evidence-based interventions to primary care. We evaluated the impact of a train-the-trainer model in two large systems to disseminate the Announcement Approach Training, which teaches providers to communicate about HPV vaccination more effectively.

Methods: In collaboration with the American Cancer Society, we partnered with two midwestern healthcare systems that served over 77,000 patients ages 11 through 17. Both systems hosted a 2-hour train-the-trainer workshop. Providers from one system then conducted in-person 1-hour CME-eligible trainings, using our standard slide set and script (available at hpvIQ.org). The other system did not implement trainings, providing a natural experiment.

Results: The train-the-trainer workshop included physicians, nurses and other clinical staff (n = 11/13 for intervention/comparison systems). The intervention system delivered 18 trainings to 234 physicians, nurses, and other clinic staff. From baseline to 6-month follow-up, the intervention system had an increase in HPV vaccine uptake that was larger than that of the comparison system for adolescents ages 11 through 12 (1.9%, p = .002) and ages 13 through 17 (1.5%, p = .015). Attending the training was associated with increased intentions to routinely recommend HPV vaccine when patients turn 11 or 12 (mean 4.19 (SD = 0.95) vs. 4.43 (SD = 0.83) as well as increased positive vaccine attitudes, self-efficacy, and norms (all p < .001). Participant satisfaction with the trainings was high (90%-94%).

Conclusion: The train-the-trainer model was effective in increasing provider motivation to recommend HPV vaccination and led to a small increase in vaccine uptake. Dissemination through large healthcare systems is promising but faces some challenges.

1. Introduction

Human papillomavirus (HPV) infection causes 6 cancers – cervical, vaginal, vulvar, anal, penile, and oropharyngeal – and anogenital warts.[1] Around 34,000 HPV cancers are diagnosed in the US each year.[2] Clinical trials and post-licensure surveillance show that HPV vaccination is a safe and effective measure to prevent HPV cancers.[3,4] The US recommends routinely delivering the vaccine to adolescents ages 11 or 12.[5,6] However, by 2019, only around half (54%) of adolescents ages 13 through 17 were up-to-date with the vaccine.[7,8] This coverage is well below the nation's goal of 80% for children ages 13 through 15 [9,10], and leaves many adolescents at risk for cancers that could be prevented. A provider recommendation is the strongest predictor of HPV vaccination uptake,[11–13] but many providers fail to recommend HPV vaccine[13,14] or recommend it using low-quality practices.[15,16]

To train providers to communicate about HPV vaccination more effectively, we developed the Announcement Approach Training (AAT).[17] The training teaches providers to use presumptive

Abbreviations: AAT, Announcement Approach Training; ACS, American Cancer Society; CME, Continuing Medical Education; CDC, Centers for Disease Control and Prevention; HPV, Human papillomavirus.

* Corresponding author at: Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, 325 Rosenau Hall, Chapel Hill, NC 27599, United States.
E-mail address: ntb@unc.edu (N.T. Brewer).

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announcements,[18–20] address parent hesitancy,[21] and raise the topic at a later visit if parents refuse. A randomized controlled trial with 30 North Carolina primary care clinics found that AAT increased adolescent HPV vaccine coverage by 5% within 3 months.[17] Healthcare providers were very satisfied with the trainings, viewed announcements as easier to use and more effective, and found that using them saved time.[22]

The AAT has generated substantial enthusiasm since its creation. Over 1,700 providers have participated in the AAT in 15 US states and the United Kingdom. The AAT is also included in the National Cancer Institute's Research-Tested Intervention Programs.[23] Despite this success, recruiting clinics is one factor that limits larger scale dissemination of the AAT. Thus, we sought to evaluate two components of a new national dissemination strategy. First, we partnered with the American Cancer Society to help recruit two large healthcare systems. Healthcare is increasingly centralized into large healthcare systems, with as few as 15% of new physicians going to work in private practice.[24] Few interventions have been developed that meet the specific goals and needs of large healthcare systems, which are sensitive to cost and vaccination quality metrics (e.g., HPV vaccine coverage).[25] Second, we developed a train-the-trainer model to allow large healthcare systems to lead trainings within their own clinics.

2. Methods

2.1. Setting and participants

Leadership from the North region of the American Cancer Society identified and recruited two large healthcare systems in a midwestern US state with HPV vaccine initiation rates in the third quartile for the nation. The two systems operated primary care clinics in the same urban and rural areas of the same state. We have anonymized the name of the state and identity of the systems to protect proprietary information. The recruitment process included meetings of the American Cancer Society, national experts, and senior leaders over a two-year period. The leaders tentatively agreed for the systems to participate in HPV vaccine communication training for all clinics in their systems that delivered adolescent vaccines as part of an on-going commitment to quality improvement. The University of North Carolina (UNC) institutional review board approved the study protocol.

2.2. Procedures

The goals and activities of the train-the-trainer workshop, AAT, and Announcement Approach are summarized in Fig. 1.

2.2.1. Train-the-trainer workshop

UNC staff delivered an online train-the-trainer workshop for AAT facilitators in late February 2019. The first hour of the workshop was an AAT with 1.0 continuing medical education (CME) credit to give the prospective trainers the experience of taking the training. The second hour built skills for presenting the AAT. We reviewed the training objectives of AAT; use of standardized AAT materials (slides, script, surveys, and handouts); and strategies for presenting the training and counseling hesitant parents. The workshop also presented more in-depth data on the effectiveness of making presumptive announcements, timing of recommendations, the efficacy of HPV vaccine, and the AAT itself. Finally, the workshop covered logistics, including updating and reviewing materials, how to practice using the script and slides, and day-of-training checklists.

2.2.2. Announcement approach training (AAT)

One of the systems decided not to host in-clinic AAT sessions and shifted to sending reminders to patients overdue for second or third doses of HPV vaccine. Thus, the study became a natural experiment allowing us to isolate the effects of the in-clinic trainings separately from the effect of training the AAT facilitators (who practice in the same clinics). We refer to the systems as the intervention and comparison systems. The intervention system required all family medicine and pediatric clinics to host and participate in AATs. Between May and July of 2019, the intervention system conducted 18 AAT workshops that staff from all of their 21 clinics attended (i.e., some trainings included multiple clinics' staff). We identified 29 clinics from the comparison system that were in the same counties that also provided HPV vaccination to adolescent patients.

Clinics that received AATs had clinic representatives participate in a logistics session to discuss how the trainings would be delivered. Staff at the healthcare system and at UNC tracked logistics using a shared master spreadsheet containing information such as clinic names, addresses, training dates, assigned facilitators and the dates and times of when the training materials were mailed and received. UNC recorded returned surveys upon receipt. This spreadsheet facilitated communication and encouraged participation. The intervention system staff coordinated scheduling of AATs and stayed in close communication with UNC staff who provided training materials to clinics in advance of trainings. UNC staff also provided instructions to clinic staff on administering and returning pre-training and post-training surveys.

The goal of the AAT is to increase HPV vaccine uptake by teaching vaccine prescribers how to make effective HPV vaccine recommendations using the Announcement Approach. The first section of the AAT, Review Evidence, covers HPV cancer incidence, HPV vaccine recommendations, data on adolescent vaccine coverage (HPV, Tdap and MenACY) tailored to the training location, impact of HPV vaccine on cancer, data on safety, and the impact of strong provider recommendations. The Build Skills section introduces the Announcement Approach (further described below), reasons for each of the suggested steps, and tips to focus on cancer prevention and to follow-up with parents who decline vaccination.[26] The Practice section includes a video of a pediatrician demonstrating the approach with a hesitant parent, participants pairing up to practice what they have learned, and a discussion of how to apply what they learned in their own clinics. AAT slides, script, and other materials are available at hpvIQ.org.

2.2.3. Announcement Approach

The Announcement Approach uses presumptive announcements to introduce adolescent vaccination by indicating that vaccinations are routine, the vaccines prevent several diseases, and there is urgency behind the suggestion to vaccinate. The steps in a presumptive announcement are to note the child's age, say the child is due for vaccines preventing three diseases (putting HPV vaccine in the middle of the list), and announce you will vaccinate today. For hesitant parents who express a concern, the steps are Connect (identify the main concern and show that you are listening), Clarify (use a research-tested message to explain what the science shows), and Counsel (recommend getting HPV vaccine today and provide a reason why).

2.3. Measures

2.3.1. Surveys

Before and after in-person Announcement Approach trainings, participants completed paper-and-pencil surveys. The pre- and post-training surveys assessed motivators of HPV vaccination including providers' HPV vaccination attitudes, perceived social

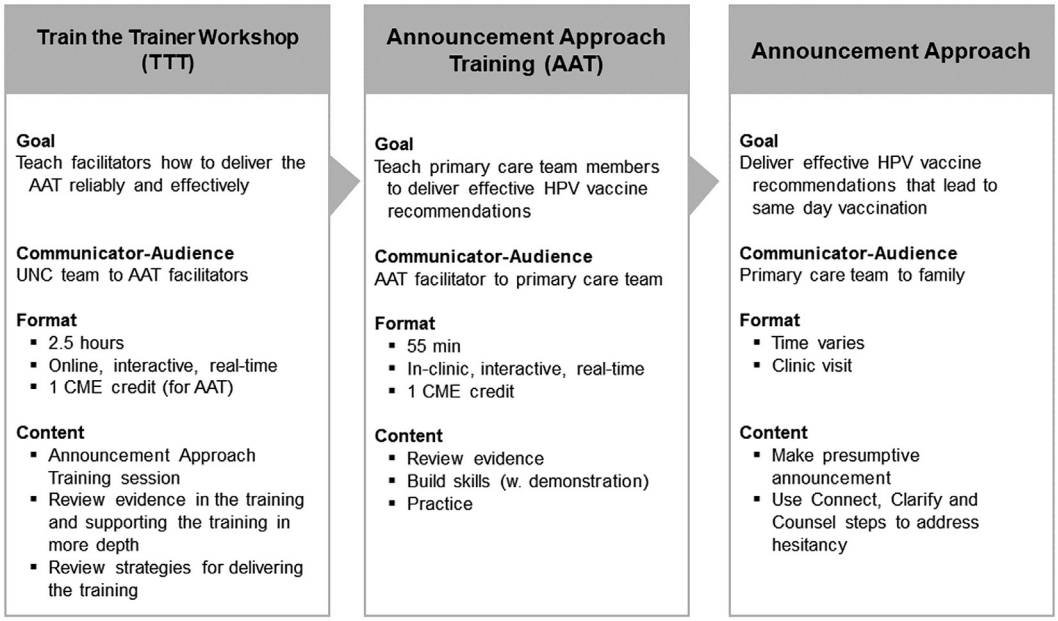

Fig. 1. Content of workshop and trainings.

norms, self-efficacy to recommend the vaccine, and intentions to recommend the vaccine. These measures demonstrated moderate to high test–retest reliability (attitude r = 0.71, norms r = 0.40, self-efficacy r = 0.60, and intention r = 0.73; all p < .001). The pre-training survey assessed provider and clinic characteristics and the post-training survey assessed satisfaction with the training.

2.3.2. Immunization data

Data on HPV vaccine initiation coverage came from the state immunization registry where the systems were located. The registry contains records for between 80% and 90% of adolescents ages 11 through 17 in the state. We obtained HPV vaccine initiation data for adolescents ages 11 through 12 and 13through 17 at baseline and the same cohort six months later. The registry provided the number of vaccine doses delivered and the total number of patients ages 11 through 12 and 13 through 17 overall for the intervention and comparison healthcare systems.

2.4. Data analysis

To compare training participants' attitudes, norms, self-efficacy and intentions between the pre- and post-training, we used repeated measures t-tests. To compare health systems' vaccination outcomes, we used logistic regression model. Predictors were system (intervention vs. comparison), time (baseline vs. 6-month follow-up), and the interaction between system and time and the outcome was HPV vaccine initiation for adolescent patients ages 11 through 12. We repeated the analysis for ages 13 through 17. The analyses weighted the system's vaccination rates by the number of patients in the registry, thus allowing us to use an individual-level analysis predicting the dichotomous outcome of vaccination status. Analyses used two-tailed tests with a critical alpha of 0.05 in SAS version 9.4 (SAS, Cary, NC).

3. Results

The train-the-trainer workshop had 11 attendees from the intervention system (7 physicians and 4 nurses and other clinic staff) and 13 people from the comparison system (4 physicians and 9 nurses and other clinic staff).

3.1. Surveys of intervention participants

Announcement Approach Trainings took place at 18 different intervention clinics. Among the 234 trainees who completed a pre-training survey, 30% were nurses, 29% were medical assistants, 20% were physicians, 14% were nurse practitioners or physician assistants, and the remaining 7% were other providers, such as practice managers or students (Table 1). Nearly half of the

Table 1
Characteristics of Announcement Approach Training participants.

	% (n)
Position	
Physician	20 (47)
Nurse practitioner, physician assistant	14 (33)
Nurse	30 (71)
Medical assistant	29 (68)
Other	6 (15)
Experience, years in position	
0	4 (9)
1–4	25 (59)
5–9	19 (45)
10–14	14 (32)
15–19	11 (25)
20+	27 (64)
Patients seen weekly	
0	13 (28)
1–4	39 (86)
5–9	19 (42)
10–14	21 (48)
15–19	4 (9)
20+	5 (11)
Role in HPV vaccination	
Schedule appointments	11 (25)
Answer parents' vaccine questions	70 (163)
Prescribe vaccines	31 (73)
Administer vaccines	59 (137)
Document vaccinations	53 (125)
No role	12 (28)

Note. Data from pre-training surveys, n = 234

providers and staff had five or more years of experience in their position (49%). Among providers and staff, the most common roles in HPV vaccination were answering parents' vaccine questions (70%), administering vaccines (59%), documenting vaccines (53%), and prescribing vaccines (31%).

All four motivators of HPV vaccination increased from pre- to post-training (Table 2). Positive attitudes toward HPV vaccination increased from pre- to post-training (mean = 4.31, SD = 0.94 vs. mean = 4.49, SD = 0.86, $p < .001$). The training was also associated with increases in social norms, recommendation self-efficacy, and intentions to routinely recommend HPV vaccine (all $p < .001$).

Satisfaction with the training was quite high (Fig. 2). Most attendees agreed that the announcement approach would fit into their clinic's workflow (90%) and well-child visits (92%). Most participants also agreed they would recommend the training (93%) and that the teacher was effective (94%).

3.2. HPV vaccine initiation

Overall, initiation of HPV vaccine for patients ages 11 through 12 increased from baseline to 6-month follow-up ($p < .001$). Across the two time periods, initiation was higher in the intervention than in the comparison system ($p < .001$). The increase for the intervention system was 1.9 percentage points larger than that of the comparison system (interaction $p = .002$; Table 3). In the intervention system, HPV vaccine initiation at baseline was 23.6% (2,158/9,141) for patients ages 11 through 12. By 6-month follow-up, initiation was 38.3% (3,806/9,947), an increase of 14.7 percentage points. In the comparison system, initiation increased from baseline (28.3%, 3,526/12,470) to follow-up (41.0%, 5,520/13,460) by 12.7 percentage points.

For patients ages 13 through 17, the increase in vaccine initiation over time was 1.5 percentage points larger for the intervention system than that of the comparison system (interaction $p = .015$; Table 3). The main effects of time and intervention condition were not statistically significant ($p = .248$ and .083). In the intervention system, HPV vaccine initiation was 45.1% at baseline and 47.0% at 6-month follow-up for patients ages 13 through 17. In the comparison system, initiation was 47.3% at baseline and 47.7% at follow-up.

Table 2
Impact of Announcement Approach Training on motivators of HPV vaccine recommendation.

Construct	Item	Pre-training Mean (SD)	Post-training Mean (SD)
Attitude	Recommending HPV vaccine is important to me.	4.31 (0.94)	4.49 (0.86)*
Norms	Most parents think HPV vaccination is important for their 11- or 12-year-olds.	3.31 (0.88)	3.75 (0.93)*
Self-Efficacy	I feel confident addressing parents' concerns about HPV vaccine.	3.81 (1.05)	4.36 (0.82)*
Intentions	I plan to routinely recommend HPV vaccine when patients turn 11 or 12.	4.19 (0.95)	4.43 (0.83)*

Note. Data from matched pre- and post-training surveys, $n = 231$.
* $p < .001$

Table 3
HPV vaccine initiation among adolescent patients.

	Comparison healthcare system % (*n*/*N*)	Intervention healthcare system % (*n*/*N*)	Difference %
11 through 12 years			
Baseline	28.3 (3,526/12,470)	23.6 (2,158/9,141)	
Follow-up, 6 months	41.0 (5,520/13,460)	38.3 (3,806/9,947)	
Change	12.7	14.7	1.9**
13 through 17 years			
Baseline	47.3 (15,451/32,695)	45.1 (10,604/23,524)	
Follow-up, 6 months	47.7 (16,270/34,106)	47.0 (11,463/24,401)	
Change	0.5	1.9	1.5*

Note. Data from state immunization registry. Baseline was April 2019 and follow-up was December 2019. **p=.002, *p=.015

4. Discussion

Provider communication training increased capacity of healthcare providers in a large healthcare system in the US Midwest. The 1-hour trainings were associated with small increases in HPV vaccine initiation among adolescents, 1–2 percentage points greater increases in the intervention system than that of the comparison system. The trainings were also associated with increases in positive attitudes toward HPV vaccine, improved social norms, higher self-efficacy to recommend the vaccine, and higher intentions to do so. Together, the findings suggest that the survey responses may be a useful indicator of impact on HPV vaccination outcomes. Finally, satisfaction with the training was very high, around the same level as trainings led by our own highly trained

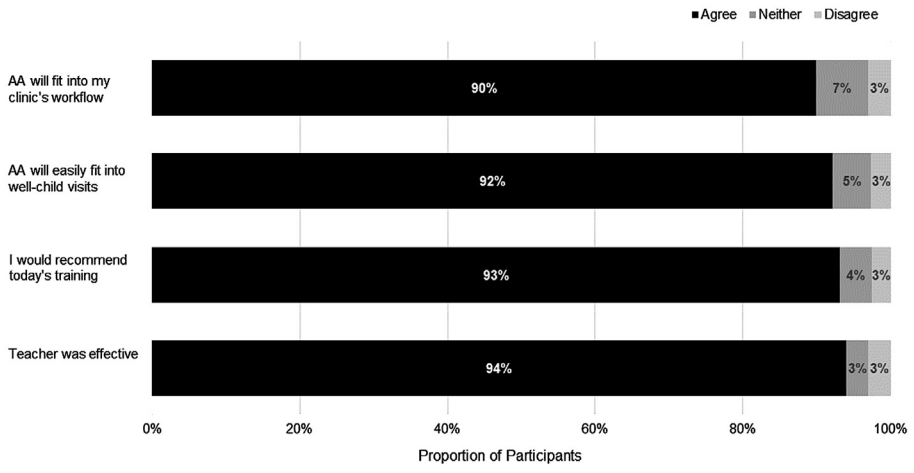

Fig. 2. Satisfaction of Announcement Approach Training participants, n = 232.

and experienced staff of physicians who have facilitated AAT sessions in the past.

In the randomized trial evaluating an earlier version of the AAT, the training increased HPV vaccine initiation by 5 percentage points among 11 through 12-year olds within 3 months, a change that was also observed at 6 months. In the present study, HPV vaccine initiation for these younger adolescents increased by 2 percentage points. The smaller effect may reflect that many providers were trained in both intervention and comparison systems. While attending the workshop and leading AAT sessions should boost intervention effects, having comparison clinics attend the workshop could increase their rates as well, leading to an underestimate. The comparison system was engaging in quality improvement initiatives, such as reminder-recall, and other HPV-related education activities at the time of our study, which likely also minimized the impact of the training. To our knowledge, the intervention system did not engage in other quality improvement efforts during the evaluation period. Finally, the vaccination findings were based on all patients attributed to the clinics, but many of them would not have come in during the valuation period. Thus, the estimated impact on HPV vaccine initiation may underestimate the true effect.

Strengths of our study include population-based data on HPV vaccination and large clinical samples from urban and rural areas. Limitations include the quasi-experimental nature of the study design. The natural experiment confirms findings of a previous RCT, but the findings should still be viewed as suggestive and not indicative of a causal effect. Also, the findings for vaccination, while statistically significant, were relatively small, potentially limiting impact on public health. The surveys of providers came only from the intervention system. Challenges to understanding the survey findings include testing-by-treatment interaction as a threat to construct validity, such that the pre-training survey may cue different learning during the training. Most AAT include pre- and post-training surveys to offer CME credit. Even so, it may be necessary to include the survey in descriptions of the intervention. The generalizability of the findings to other areas of the country and to smaller practices remains to be demonstrated. We did not have access to information on clinic characteristics to adjust our analyses.

The train-the-trainer model was successful in creating trainings that were high-quality with modest impact on HPV vaccination rates. However, we lost one of the two systems along the way, which suggests potential challenges to implementing a train-the-trainer model with systems. We were able to access all HPV vaccine-providing clinics in one system (100% reach, well above 20%-25% which is more typical for our trainings). When one of the two systems withdrew from the AAT implementation, this created a unique opportunity to estimate the impact of AAT outside of a tightly controlled clinical setting. However, the system withdrawal also reduced our reach and illustrates the uncertainties of working with large healthcare systems. The train-the-trainer model remains interesting for partnering with large healthcare systems looking to improve HPV vaccine initiation in adolescents.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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