



The challenge of HPV vaccination uptake and opportunities for solutions: Lessons learned from Alabama



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ABSTRACT

The human papillomavirus (HPV) vaccine is an important tool for cancer prevention. However, vaccination rates in Alabama, a state with high rates of HPV-related cancers, remain below the national average. Our objective was to develop a comprehensive assessment of HPV vaccination in our state, with the goal to make recommendations for tailored multilevel interventions. A multimodal approach with quantitative and qualitative data was used to determine barriers and facilitators to HPV vaccination in Alabama. This included a survey of pediatric care providers and structured interviews with pediatricians, parents, nurses and community stakeholders. Two separate investigators evaluated the interview transcripts for major themes that occurred in 65% or more interviews. Major barriers included lack of knowledge, concerns about vaccine safety, and the link between the HPV vaccine and sexuality. Qualitative interviews further revealed barriers such as misinformation received from the internet and parental vaccine hesitancy. Opportunities for increasing vaccination include parental education, establishment of a reminder system, increasing access to HPV vaccine providers, and education for providers. Additional facilitators revealed through interviews included: trust in physicians, using the internet or social media to propagate positive messaging, physicians and clinical staff education, utilizing existing technology more effectively, highlighting nurses' roles as partners in HPV prevention, and the potential of schools as a venue for promotion of the vaccine. Our data are consistent with prior research showing major barriers to HPV vaccination. Several recommendations for optimizing HPV vaccination uptake in Alabama on the patient, provider and system level are given.

1. Introduction

Over 38,000 new cases of HPV-related cancers are diagnosed annually in the United States, including 12,000 cases of cervical cancer in women and over 15,000 cases of oropharyngeal cancer in men and women (Viens et al., 2016). Cervical cancer is the most common HPV-related cancer among women, and Southern states have some of the highest cervical cancer incidence and mortality rates. Recent data show that from 2004 to 2013 the cervical cancer incidence in Alabama was 8.5 cases/100,000, compared to the US rate of 7.7/100,000 (American Cancer Society, 2016; Siegel et al., 2017).

Through greater understanding of the link between HPV and cancer, a preventive vaccine was developed with the potential to prevent more than 30,000 cases of HPV-related cancers every year in the US (Benard et al., 2017; Brotherton et al., 2011; Brotherton et al., 2015; Saraiya et al., 2015). The Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP) recommends HPV vaccination for all girls and boys ages 11 to 12, starting as early as

9 years old (Meites et al., 2016). Despite overwhelming evidence of the safety and efficacy of this vaccine (Lehtinen et al. 2012), overall rates of vaccine series initiation and completion remain low in the US. In 2016, Alabama ranked 43rd for adolescent HPV vaccination rates (Walker et al., 2017). In the setting of these low vaccination rates, the University of Alabama at Birmingham Comprehensive Cancer Center obtained a supplement from the National Cancer Institute to identify gaps and opportunities in HPV vaccination. Through this several activities have been completed or are ongoing, including a comprehensive environmental scan to obtain a deeper understanding of barriers, facilitators, and solutions that can guide the development of multi-level public health interventions to promote HPV vaccine uptake. The purpose of this paper is to discuss the results of this assessment and to propose areas of opportunity moving forward.

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2. Methods

2.1. Theoretical framework

Barriers and facilitators to HPV vaccination exist at the system, provider and parent/patient levels (Holman et al., 2014; Rambout et al., 2014). Therefore, the PRECEDE-PROCEED model was used for data collection, analysis and interpretation (Green and Kreuter, 2004), with a focus on the PRECEDE (Predisposing, Reinforcing, and Enabling Constructs in Educational/Environmental Diagnosis and Evaluation) phase of the model. Predisposing factors involve the intrapersonal knowledge, beliefs and values that affect an individual's healthcare decision-making. Enabling factors describe the structural, logistic or policy factors that are involved in HPV vaccination uptake. Reinforcing factors include the interpersonal, family or social influences on healthcare decision making. This model aided our team in performing an epidemiological and environmental assessment of the status of HPV vaccination in Alabama through multiple sources of data: examination of existing HPV vaccine data as well as original quantitative and qualitative data collection with different stakeholders. The PRECEDE-PROCEED model (Hiatt et al., 2018) and multimodal research approaches (Dohan and Schrag, 2005) have previously been used successfully in the development of cancer prevention programs and interventions.

2.2. Alabama HPV vaccine data

We examined state and national immunization rates from the Centers for Disease Control and Prevention (CDC) annual National Immunization Survey (NIS)-Teen. Additionally, the Alabama Department of Public Health (ADPH) provided data from the Immunization Patient Resources with Integrated Technology system (ImmPRINT) in order to examine rates at the local level, and to compare to CDC data. This system uses provider-level vaccination data to track children and adolescent vaccine doses. Utilization of this system is voluntary, and it is unknown what proportion of providers use it. We also queried physician license records through the Alabama Board of Medical Examiners (ALBME). We requested data on number of physicians licensed in family medicine, pediatrics and obstetrics/gynecology in all 67 Alabama counties.

2.3. Provider survey

Pediatricians and family medicine physicians were contacted through the Alabama chapters of the American Academy of Pediatricians (AAP) and the American Academy of Family Physicians (AAFP) in 2015. AAP members were emailed an online survey and AAFP members were handed surveys at their annual meeting. The 21-item survey included yes/no, Likert-type and open-ended questions focusing on provider HPV vaccination practices, attitudes, and perceived barriers and facilitators to HPV vaccination. The primary purpose of these surveys was to generate preliminary data for development of subsequent qualitative interviews, and they represented a convenience sample of voluntary participants.

2.4. Qualitative interviews

Alabama counties with fewer than 20% HPV vaccination rates based on ImmPRINT data were identified. Among these, three counties (Tuscaloosa, Lee and Shelby) were selected for the study due to their driving distance from Birmingham, as some interviews and recruitment would be done in person. Practicing pediatricians in these counties were recruited via email. Parents and clinical staff members were recruited in-person at the participating pediatrician offices. Clinical staff were included if they were actively involved in patient care and either a registered nurse, licensed practical nurse, or medical assistant. Written

informed consent was obtained and the interview conducted on the same day. Parents were included if they were 18 years of age or older, were the primary caregiver of at least one child between the ages of 10 and 13, and were present at the physician's office for a well-child visit on the day of recruitment. Parental written informed consent was obtained at the physician's office, and phone interviews scheduled for a time within one week of recruitment. Organizations with a vested interest in HPV vaccination activities in the state were identified a priori, with the goal of recruitment from a variety of perspectives including non-profit, government and payor. A convenience sample of representatives of those organizations were then contacted for participation via email for the stakeholder interviews. Interviews were conducted between March 2016 and April 2017.

A standardized interview topic guide with open-ended questions was developed for each group with overlapping questions to facilitate comparisons. These questions focused on provider HPV vaccination practices and attitudes as well as barriers to and opportunities for vaccination on system, provider and patient levels. Each group of interviews was performed by one investigator to maintain consistency between participants. Participants were reimbursed \$50 for their time. Interviews were recorded and transcribed. This research was approved by the UAB Institutional Review Board.

Two investigators independently evaluated the interviews for codes using an iterative sampling approach. Codes were reviewed, revised and agreed upon by both coders at regular intervals during the coding process. These codes were sorted and combined into representative themes. Themes that occurred in the majority (at least 65%) of interviews in one category of participant were considered major themes. Qualitative data was organized and analyzed using NVivo software (QSR International, Australia).

3. Results

3.1. Alabama HPV vaccine data

According to CDC data, vaccination rates in Alabama fall below the national average for vaccine initiation and completion among 13–17 year olds (Walker et al., 2017; Reagan-Steiner et al., 2015; Reagan-Steiner et al., 2016). Rates increased from 2014 to 2015, and remained stable from 2015 to 2016. There was a statistically significant increase in vaccination rates for boys from 2014 to 2015, from 16.1% to 30.3% for ≥ 2 doses, while the rate increase for girls was not statistically significant (Reagan-Steiner et al., 2016). 2016 data demonstrate lower than national average vaccination rates for all adolescents (35.4% vs. 43.4%), boys (24.7% vs. 37.5%) and girls (36.5% vs. 49.5%) (Walker et al., 2017).

This differs from data from the state reporting system, ImmPRINT. Examining the number of adolescents receiving three doses of the vaccine with census estimates of number of adolescent children age 13–17 in a county as the denominator, the 2016 overall statewide vaccination rate is only 18%, a decrease of 1% from 2015. County-specific rates ranged from 9% to 38%. When stratified by gender, 14% of boys and 22% of girls had received three doses in 2016. Given that the CDC places this at 24.7% for boys and 36.5% for girls ages 13–17, the ImmPRINT results are likely underestimated.

According to ALBME records, there are 23 counties in Alabama without a pediatrician (34%), 15 without an obstetrician-gynecologist (22%) and three without a family medicine physician (4%). All counties but one have a health department where the HPV vaccine is available. When compared to county-level ImmPRINT data, a higher percentage of vaccine series completion was not correlated with a higher number of pediatricians ($\rho = 0.014$, $p = 0.9$) per county, as would be expected.

3.2. Provider survey

The provider survey received 49 responses, 58% from pediatricians

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