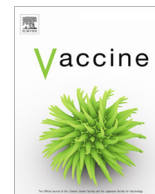




Contents lists available at ScienceDirect

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

An innovative medical school curriculum to address human papillomavirus vaccine hesitancy

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ARTICLE INFO

Article history:

Received 3 April 2018

Received in revised form 1 May 2018

Accepted 2 May 2018

Available online xxxx

Keywords:

Human Papillomavirus (HPV)

HPV vaccine

Vaccine hesitancy

Medical education

C.A.S.E. method

Curriculum

ABSTRACT

Background: Vaccination rates against Human Papillomavirus (HPV) in the US remain alarmingly low. Physicians can significantly influence a parent's decision to vaccinate their children. However, medical education often lacks training on specific strategies for communicating with vaccine hesitant parents.

Methods: We created an innovative curriculum designed to teach medical students how to address HPV vaccine hesitancy. The curriculum consisted of (1) a presentation on the epidemiology, biology, and disease morbidity associated with HPV, (2) a video that teaches specific communication strategies and (3) role-playing simulations. This curriculum was delivered to medical students at two separate sites. Medical students were surveyed before and after completing the educational curriculum. The surveys assessed student comfort talking to HPV vaccine hesitant parents and their likelihood to recommend the HPV vaccine.

Results: Pre- and post-intervention surveys were completed by 101 of the 132 participants (77% response rate). After the intervention, student awareness of the benefits of the HPV vaccine increased by a mean of 0.82 points (Likert scale 1–5, $p < 0.01$) and student comfort talking to vaccine hesitant parents increased by a mean of 1.37 points ($p < 0.01$). Prior to the intervention, students more strongly recommended the HPV vaccine to females compared to males, but this gender disparity was eliminated after the intervention ($p < 0.01$). Personal vaccination status was independently associated with a higher likelihood of recommending the HPV vaccine both before and after the intervention.

Conclusion: Our innovative curriculum improved medical student comfort level discussing HPV vaccination with hesitant parents and increased the perceived likelihood of recommending HPV vaccination. The intervention is easy to implement, scalable, and requires minimal resources. Educating future providers on this important topic has the potential to improve vaccination rates nationwide and thus should be considered for all medical students.

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1. Introduction

Human Papillomavirus (HPV) is the most common sexually transmitted infection in the US, with approximately 14 million new cases occurring each year [1]. It is associated with the development of pre-invasive and invasive cancers of the cervix, vulva, vagina, anus, penis and oropharynx with over 38,000

HPV-associated cancers diagnosed in the US each year [2]. HPV vaccination holds promise for reduction of disease burden in the US and worldwide.

HPV vaccination was first approved for young women in the US in 2006. Since then, its approval has been expanded to both males and females. The newest 9-valent HPV vaccine protects against up to 73.5% of HPV-associated cancers [3]. Unfortunately, HPV vaccination rates in the US remain low, with completion rates of 49.5% for females and 37.5% for males nationwide [4]. Furthermore, HPV vaccination is becoming increasingly important as the prevalence of HPV-containing oropharyngeal squamous cell carcinomas has increased dramatically and is now the most common HPV associated cancer [5].

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<https://doi.org/10.1016/j.vaccine.2018.05.014>

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Vaccine hesitancy has become a concerning issue among healthcare providers, as many parents refuse or choose to delay vaccines for their children [6]. Vaccine refusal happens for many reasons, including social influences and concerns about vaccine safety, necessity, and cost [7]. Notably, lack of physician recommendation is frequently cited as the primary reason parents choose not to vaccinate [7–10]. Physicians influence parental beliefs and attitudes and it is well established that provider recommendation improves vaccination rates [11]. Results from US national immunization survey found that female adolescents who received a provider recommendation for the HPV vaccine were almost 5 times more likely to initiate the HPV vaccine series compared to adolescents who did not receive this recommendation, and this association persisted across all races and sociodemographic groups [12].

Many providers report inadequate training and low comfort levels responding to questions from vaccine hesitant parents [13,14]. Improving provider comfort and teaching communication strategies is key to addressing low vaccination rates [15]. Providing a curriculum that addresses vaccine hesitancy during medical school has the potential to reach a broad population of future physicians. In this study we hypothesized that applying a multimodal curriculum (including evidence-based lecture, communication methodology, and simulation training) targeted at medical students would improve medical student confidence in addressing the concerns of vaccine hesitant parents. Improving confidence in addressing vaccine hesitant parents is an important step towards improving vaccination rates nationwide and thus should be a part of medical school training.

2. Materials and methods

All medical students at the University of Minnesota were eligible to participate in this educational curriculum and research study. This study was conducted at the University of Minnesota Medical School, Twin Cities (UMTC) and Duluth (UMD) campuses. Announcements were emailed to all medical school students at both campuses. On the day of the study pre-clinical students were notified by an in class announcement. After obtaining informed consent, medical students completed a pre-intervention survey. They then participated in an HPV vaccination curriculum consisting of a lecture, video, and role-play simulation. At the end of the study period they completed a post-intervention survey. Participation in the surveys and the HPV vaccination curriculum was voluntary. This study was approved by the University of Minnesota Institutional Review Board.

2.1. HPV vaccination curriculum

The curriculum began with a presentation by a board-certified Gynecologic Oncology physician. The presentation highlighted the epidemiology of HPV associated disease, basic science of the HPV virus and vaccine, and treatment and prognosis of HPV related cancers.

Next, students watched a video on implementing both the presumptive method and the C.A.S.E. (Corroborate, About me, Science, and Explain/advise) method with vaccine hesitant parents [16].

The presumptive method teaches students to use a direct statement when discussing vaccination, such as “Today you will be receiving your HPV vaccine.” Students were taught not to use participatory language, such as “Would you like to receive your vaccine today?”. If the presumptive approach was unsuccessful, students were instructed to then use the C.A.S.E. method to provide a framework to address the parent’s concerns in a compassionate manner.

The C.A.S.E. method provides an organized approach toward conversing with a vaccine hesitant parent [16]. It allows the physician to address the parent’s concern, while keeping the conversation focused. First, the clinician asks for the parent’s specific concern regarding vaccination. Then they proceed through the following steps: (C) *Corroborate* by acknowledging and validating the patient’s concern, (A) *About Me* by explaining how the physician became an expert on the issue, (S) *Science* by relaying the scientific facts addressing the parent’s concern, and (E) *Explain/Advise* by summarizing the recommendation, emphasizing the health risks of HPV infection, and strongly urging the parent to agree to the vaccine. If the exact science behind the concern was not known, students were instructed to ensure parents that the vaccine is safe, effective, and protects against a dangerous disease. The video explained the C.A.S.E. method and showed medical students interacting with a vaccine hesitant parent who believed natural immunity was better for their child.

The final segment of the curriculum involved a simulation role-play. Students self-sorted into groups of 3 and role-played 3 separate scenarios using the presumptive and C.A.S.E. methods. For each scenario students played the role of either a provider, patient or observer. An example C.A.S.E. conversation with a checklist was provided to the observer to help direct the conversation if students needed guidance and to facilitate giving constructive feedback after each scenario.

2.2. Pre-intervention and post-intervention surveys

An anonymous, 9-question pre-intervention survey and 14-question post-intervention survey were administered to assess each student’s gender, personal vaccination status, likelihood of recommending the HPV vaccine to varying age groups/genders, and comfort conversing with HPV vaccine hesitant parents. The post-intervention survey also assessed student opinion on the C.A.S.E. method as a useful approach in talking to vaccine hesitant parents. Both surveys contained Likert scales, which ranged from 1 to 5 with 1 corresponding to “never recommend” or “not comfortable” and 5 corresponding to “always recommend” or “extremely comfortable.” The pre-intervention survey was administered to all participants at the beginning of the training session. The post-intervention survey was administered immediately following completion of the HPV vaccination curriculum. Students who did not complete a question or illegibly circled an answer were treated as missing for that question.

2.3. Statistical analysis

Our primary objective was to determine if the HPV curriculum increased HPV vaccine awareness, likelihood to recommend, and comfort level conversing with vaccine hesitant parents. We initially performed Wilcoxon signed rank tests for all statistical analyses with resulting p values <0.01. Based on our sample size and the robustness of parametric tests, we determined that paired T-tests would better represent the data [17]. Thus, for the primary outcome, paired T-tests were performed to determine if there were differences in Likert responses between pre- and post-intervention surveys and between various survey questions. Paired T-tests were performed for various questions for the different strata of location, gender, and student vaccination status. To investigate the effect of student vaccination status, cumulative logit models were performed, with and without adjustment for gender. Subjects’ opinions on the C.A.S.E. method post intervention were descriptively summarized using bar plots. A one-sample T-test was performed to determine if the Likert responses for the C.A.S.E. method questions were different from neutral. Due to the nature of this study, we did not perform a sample size calculation, and used a sample

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