Review

Literature review of human papillomavirus vaccine acceptability among women over 26 years

Lora L. Black⁠,c, Gregory D. Zimet⁠,b, Mary B. Short⁠,a,c, Lynne Sturm⁠,d, Susan L. Rosenthal⁠,a,∗

a Department of Pediatrics, University of Texas Medical Branch, 301 University Boulevard, Galveston, TX 77555-0319, United States
b Department of Pediatrics, Section of Adolescent Medicine, Indiana University School of Medicine, Indianapolis, IN, United States
c Department of Psychology, University of Houston at Clear Lake, Houston, TX, United States
d Department of Pediatrics, Riley Child Development Center, Indiana University School of Medicine, Indianapolis, IN, United States

A R T I C L E   I N F O
Article history:
Received 21 August 2008
Received in revised form 18 December 2008
Accepted 8 January 2009
Available online 3 February 2009

Keywords:
Human papillomavirus vaccine
Sexually transmitted diseases
Adult women
Acceptability

A B S T R A C T
Vaccines for the human papillomavirus (HPV) are currently licensed for females, ages 9 through 26 years old in the U.S., and for adult women up to 45 years in some countries such as Australia. As licensure for adult women, over 26 years, is sought in other countries, it will be important to determine the acceptability to them. We reviewed the available articles on adult opinions and acceptability of vaccinating women against HPV. Predictors of acceptability included barriers, knowledge, risk, age, and marital status. Overall, acceptability rates were high, if adequate information was given and the cost was affordable.

© 2009 Elsevier Ltd. All rights reserved.

1. Introduction

Women and their infants can have serious consequences as the result of HPV infection. Cervical cancer is the seventh most common cancer worldwide and is the second most common cancer in females worldwide. In the United States, age-adjusted rates of cervical cancer are 7.7 and mortality rates are 2.3 per 100,000 people [1,2]. In addition, genital warts, another consequence of HPV infection, affect 7.2% of American women [3]. Recurrent respiratory papillomatosis, the consequence of transmitting this infection to an infant at birth, although rare, is associated with obstruction of the airway, stridor, progressive hoarseness, and respiratory distress [4]. Less common consequences include recurrent pneumonia, persistent cough, shortness of breath, difficulty swallowing, and failure to thrive [4].

There are two vaccines that can prevent HPV infection and currently are available and licensed in some parts of the world. One, Gardasil®, is a quadrivalent vaccine, targeting the two most common types of HPV associated with cervical cancer and the two most common types associated with genital warts. The other vaccine, Cervarix™, targets the two types of HPV associated with cervical cancer. Both Gardasil® and Cervarix™ have demonstrated excellent
safety profiles and are being offered to girls [5,6]. Some countries (e.g., Australia) have approved the quadrivalent vaccine for adolescent males based on safety and immunogenicity data. Other countries, such as the United States, are waiting for efficacy data in males.

The prevalence of HPV is highest among those under 20 years old (22%). The prevalence stabilizes at between 5 and 10% at about 30 years of age (rates adjusted for variations in study, region, and publication year) [7]. Given the high prevalence of HPV infection among sexually experienced individuals [8], and the fact that the vaccine is prophylactic and only effective against HPV prior to exposure, it seems relatively clear that the best prevention strategy is to vaccinate adolescents and pre-adolescents prior to exposure and to adopt a universal, age-based vaccination strategy. Adult women, over the current Advisory Committee on Immunization Practices (ACIP) recommended age of 26 years, who have not had the opportunity to be vaccinated and have remained uninfected with one or more vaccine-related HPV types, could still benefit from vaccination. Studies are currently underway looking at the efficacy of the quadrivalent vaccine in women up through age 45 years [9], and the bivalent vaccine in women through 55 years of age [10,11]. Preliminary results show that the quadrivalent vaccine is efficacious in preventing the infections and diseases caused by the types of HPV covered by the vaccine and is well tolerated in this population [9]. The bivalent vaccine also has been shown to be efficacious and well tolerated in women over 26 years of age [10,11].

Although many studies have found that vaccinating younger populations will be cost-effective compared to the medical costs of cervical cancer and other HPV related illnesses [12–14], catch-up vaccination of older women may not be cost-effective than vaccinating adolescent girls because of waning prevalence after this age [15]. Country-specific HPV prevalence and incidence data need to be evaluated in order to determine the cost-effectiveness of vaccinating adult women in different areas of the world. However, evaluation of HPV vaccine acceptability among adult women and understanding sociodemographic, behavioral, and attitudinal factors associated with acceptability also will be important to assess interest in the vaccine and for the design of effective health communication strategies.

In the following manuscript, we review the published research literature regarding attitudes towards HPV vaccination among adult women, over 26 years of age. We included 14 articles on HPV vaccine acceptability that included adults over 26 years of age and specifically assessed their attitudes towards vaccination of themselves. Articles that assessed only attitudes towards vaccinating children or only assessed knowledge were excluded. The studies were conducted in six different countries with four different continents represented. All studies were carried out prior to licensure of the vaccine and, therefore, focused on attitudes and intention rather than vaccine acceptance. Eleven of the studies used quantitative research methods [16–26], whereas three used qualitative approaches [27–29]. Table 1 summarizes the basic content of each article.

### 1. Acceptability

Across the various studies acceptability of HPV vaccine was measured in a variety of ways, making direct comparisons of findings somewhat difficult. Two of the studies used a single item with a yes/no response option [17,23]; others used either single or multiple items with Likert-type scale response options [16,19,20,25].

One study using multiple items evaluated relative acceptability of HPV vaccine as a function of cost [25]. Further, some studies only asked about acceptability for self, whereas others also asked about acceptability regarding HPV vaccination of a child. Data collection for six studies was done through paper–pencil questionnaires, one used an interview format, and three were conducted over the phone. Three studies used focus groups. Overall, seven of the studies recruited participants exclusively from outpatient medical clinics, three recruited participants from both clinic and community settings, and one recruited participants from the community. Three of the studies randomly recruited participants over the phone. The types of response choices provided, the wording of the acceptability question(s), and method for recruitment and data collection all may influence study results.

Despite the challenges of comparing findings across studies, both the qualitative and quantitative research strongly suggests that most women have positive attitudes about receipt of HPV vaccine. Interestingly, three articles also assessed the attitudes of males towards vaccination of both male and female adults. These studies found that, compared to women, men had similar or just slightly lower rates of acceptability [21,22,27].

The highest rates of acceptability (96% had favorable attitudes) were found in a study of Turkish women who ranged in age from 17 to 35 years and were recruited from an obstetrics/gynecology clinic [23]. The lowest rates were found in a study from Belgium, in which only half of the women (also recruited from obstetrics/gynecology clinics) said yes, for sure [24]. However, the results of this study demonstrate the importance of considering response options, in that another 44% of the sample said maybe, if I can get more information about the illness and vaccine. Thus, 94% did not express negative attitudes towards HPV vaccination [24].

In general, the studies found that women did not view the sexually transmitted nature of the virus as problematic. However, for some women, embarrassment and fears of others seeing them as promiscuous may present a barrier to acceptance [28,29]. Results of the studies varied as to whether participants believed that getting vaccinated would lead women to change their sexual behaviors (e.g., decreasing use of condoms) [16,24,29].

### 2. Predictors of acceptability

#### 2.1. Knowledge

Greater knowledge about HPV may be associated with greater vaccine acceptability [16,18,22,24–29]. Across studies, women indicated an interest in learning more about HPV and a desire to have more information about HPV vaccination [27,30,31]. In the U.S., prior to licensure there was an increase in media education about HPV, and after licensure about the quadrivalent vaccine. It is possible that this media exposure has increased U.S. women’s knowledge about HPV and vaccination. The timing and effect of media exposure in other countries is unknown. However, many of the participants from a variety of countries, including the U.S., had not heard of HPV, and did not always understand the link between cervical cancer and HPV. In some cases the participants were taken aback by the link between HPV and cervical cancer and had difficulty believing the link existed [27,28]. Two studies by the same investigators assessed acceptability rates before and after an educational intervention. However, the authors did not assess for statistical difference and used different questionnaires pre and post, thus limiting the ability to draw conclusions about the impact of the intervention [18,26].

#### 2.2. Experience

Women’s historical/behavioral experiences related to HPV may play a role in vaccine acceptability. The relationship of abnormal Pap smears with vaccine acceptability was inconsistent with some studies finding a link [26], and others finding no relationship [17,19,23]. In the one study that found a link, women who had a history of...
<table>
<thead>
<tr>
<th>Reference</th>
<th>Region</th>
<th>Participants</th>
<th>Method</th>
<th>Acceptability for self</th>
<th>Initial knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baykal et al. [23]</td>
<td>Turkey; Urban</td>
<td>143 women aged 17–35+ recruited from outpatient OB/GYN clinics</td>
<td>Questionnaire</td>
<td>96% acceptance; 94% intention</td>
<td>Most (69%) who had heard of HPV vaccine heard it through the media; about 1/2 knew cervical cancer was caused by a viral infection; only 29% knew that HPV was a virus and 40% could not provide an answer to what HPV stands for</td>
</tr>
<tr>
<td>Donders et al [24]</td>
<td>Belgium; Urban</td>
<td>372 women aged &lt;25–40+ (mean age 35.8) recruited from outpatient OB/GYN; 98% response rate</td>
<td>Questionnaire</td>
<td>About half would accept, but wanted more information; had no problem the vaccine was related to a STI</td>
<td></td>
</tr>
<tr>
<td>Ferris et al. [26]</td>
<td>United States; Urban</td>
<td>472 mid-adult women aged 25+ recruited from community and medical clinics; 70% response rate</td>
<td>Questionnaire</td>
<td>More likely to get it if they had more HPV knowledge, younger than 55, had abnormal Pap, knew they were at risk; educational component made a difference; less likely to get it were opposed to vaccines in general, thought it was too late to get it, mid-adult women in a monogamous relationship</td>
<td></td>
</tr>
<tr>
<td>Fazekas et al. [25]</td>
<td>United States; Rural</td>
<td>146 women (mean age 42) recruited from OB/GYN clinics; 65% African American; 77% response rate</td>
<td>Questionnaire</td>
<td>66% willing to get it if free; less acceptability for self than daughters</td>
<td></td>
</tr>
<tr>
<td>Sauvageau et al. [22]</td>
<td>Canada; Urban and rural</td>
<td>471 men and women aged 18–69 (mean age 45) recruited from outpatient clinics; 60% response rate</td>
<td>Phone survey</td>
<td>83% of people 18–29 were willing to get vaccine, but the acceptability decreased if the vaccine cost $100 per dose</td>
<td></td>
</tr>
<tr>
<td>Hopenhayen et al. [20]</td>
<td>United States; Rural</td>
<td>300 women aged 18–70+; 61% response rate</td>
<td>Random digit-dial phone survey</td>
<td>83% acceptance, this decreases with age</td>
<td></td>
</tr>
<tr>
<td>Marshall et al. [21]</td>
<td>Australia; Urban and rural</td>
<td>2002 males and females aged 18–75+ (median age 53.1); 77% response rates</td>
<td>Random digit-dial phone survey</td>
<td>65% acceptance (73.4% of women and 67.9% of men) after short standardized information about HPV and Pap smears was given; 85% of parents were accepting</td>
<td></td>
</tr>
<tr>
<td>Scarinci et al. [29]</td>
<td>United States; Urban</td>
<td>28 Latina and 27 African American women aged 17–39</td>
<td>Focus groups</td>
<td>Both groups receptive to vaccine; Afr. Am. more skeptical of side effects and effectiveness Lat. Very accepting, esp. if recommended by doctor or other credible source</td>
<td></td>
</tr>
<tr>
<td>Lee et al. [28]</td>
<td>China; Urban</td>
<td>49 women aged 18–58 (mean age 31) recruited from women’s health clinics</td>
<td>Focus groups</td>
<td>Accepting of vaccine, but not as a protection against STI (do not see need for STI protection) but as extra precaution against cancer; not worried about cost or mode of administration</td>
<td></td>
</tr>
<tr>
<td>Gerend et al. [19]</td>
<td>United States; Urban</td>
<td>58 low-income minority women aged 18–50 (mean age 26.4) recruited from community health clinics</td>
<td>Semi-structured interviews</td>
<td>High acceptability rate (76% gave 5–6/6); acceptance predictors: safety of vaccine, doctor support of vaccine, previous HIV testing</td>
<td></td>
</tr>
<tr>
<td>Ferris et al. [18]</td>
<td>United States; Urban</td>
<td>472 women aged 25+ recruited from community and medical settings; 70% response rate</td>
<td>Questionnaire</td>
<td>Before educational intervention, 59.6% acceptance; after intervention, 50.2% acceptance (57.8% when neutral option not offered)</td>
<td></td>
</tr>
<tr>
<td>Slomovitz et al. [17]</td>
<td>United States; Urban</td>
<td>200 women aged 23–53 (mean age 34.4) with children between 8 and 14 years old recruited from adolescent medicine and OB/GYN clinics</td>
<td>Questionnaire</td>
<td>77% of participants would be willing to accept vaccine</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 (Continued).

<table>
<thead>
<tr>
<th>Region</th>
<th>Participants</th>
<th>Method</th>
<th>Acceptability for self</th>
<th>Initial knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States; Urban</td>
<td>52 women aged 18–30 (mean age 25) recruited from community and medical clinics; 98% response rate</td>
<td>Questionnaire</td>
<td>98% of participants believe that getting the HPV vaccine would be a very good or somewhat good idea; 85% of participants said they would be extremely or very likely to receive HPV vaccine</td>
<td>Participants answered a mean of 70% of questions correctly regarding HPV knowledge; fewer than 50% answered the question “HPV is a leading cause of cervical cancer” correctly.</td>
</tr>
<tr>
<td>United States; Urban and rural</td>
<td>314 men and women aged 25–45 (mean age 35) randomly recruited through random digit-dialing of areas associated with high levels of cervical cancer, HIV, and syphilis prevalence</td>
<td>Focus groups</td>
<td>Most participants felt that the decision to get the vaccine was a personal decision; desire to protect one’s health was a factor influencing acceptability; lack of perceived HPV susceptibility, cost, and perceptions of being promiscuous were barriers to acceptability</td>
<td>Very low HPV knowledge; most participants did not know how common HPV was or the link between HPV and cervical cancer; most participants were surprised to hear about the HPV-cervical cancer link.</td>
</tr>
</tbody>
</table>

2.3. Perceptions of risk

Perceptions of the risk of HPV acquisition and/or engagement in behaviors which may actually place women at risk may be related to acceptability. With regards to perceptions, women who believed they were at risk for HPV or cervical cancer were more likely to accept the vaccine in comparison to those that felt they were at little to no risk [16,19,25,26]. However, it should be noted that these studies were limited to assessing the cognitive assessment of risk. Other research has demonstrated that when cognitive and emotional reactions diverge, the emotional reactions are a better predictor of behavior [32]. Given the hypothetical nature of these studies, it is difficult to assess the emotional assessment of risk. With regards to the relationship of behaviors, which may have placed the women at actual risk for HPV, the results are inconclusive. Two studies found that there was no correlation between number of sexual partners and intention to get the vaccine [16,19]. There were mixed results related to age of first intercourse and willingness to accept the HPV vaccine, with one study finding a significant correlation [26] and another study finding no correlation [19]. In addition, previously having an HIV test was correlated with vaccine acceptability [19]. Thus, it is possible that having been tested for HIV indicates a higher perceived risk of HPV and/or engagement in diagnostic or preventive health behaviors.

2.4. Demographics

Other factors associated with acceptability include age and marital status. Two studies found that vaccine acceptability decreased with age [20,21]. It may be that some older women believe that it is too late for them to get the vaccine [26]. Other studies found that compared to women not in a monogamous relationship, women who were married or in a monogamous relationship viewed HPV vaccination as less acceptable [16,20,21,26]. It is likely that these women see themselves at relatively low risk for HPV infection and thus are less likely to be interested in vaccination. It is important to note, however, that two studies found no relationship of age or marital status to vaccine acceptability, indicating that even these clearly defined demographic factors are not reliably predictive of attitudes about HPV vaccine [16,23].

2.5. Cost

Vaccine cost will almost certainly act as a barrier to vaccination. For example, in a study conducted in Canada, 41% of participants 26–30 years old strongly agreed that they would get the vaccine if it were free, but this dropped to 28% if they had to pay US$ 100 per dose [22]. These findings are consistent with results of several studies of attitudes about HIV vaccination indicating that increased cost was associated with lower acceptability [33,34].

2.6. Misinformation

Misinformation and inaccurate information in the media and the Internet also may negatively influence perceptions of the HPV vaccine, just as it has with other vaccines [35,36]. Sixty-nine percent of women reported that the media was the source of their information about HPV [24]. It will be important to investigate how misinformation and anti-vaccine publications will influence acceptance of the HPV vaccine in the future.
3. Future directions

Although research findings from a variety of continents and countries were available for review, no data were available from Africa or Central/South America. Many of countries in these continents have limited screening programs and have high rates of cervical cancer [2]. Understanding the attitudes of individuals in these countries will be an important addition to this literature.

It will be important to understand the unique issues in implementing a vaccination program for adult women. No studies were found about the attitudes of health care professionals or addressing the barriers to implementation of vaccination programs, including how individuals or countries will fund this vaccine for adult women. One possible strategy to investigate could be simultaneous vaccination of the mother and daughter. This vaccine will open up the door for health care professionals not usually associated with immunizations to become involved in vaccinating people; thus, creating a need for education in this area.

It will be critical to understand what information individuals will want to have in order to make the decision to vaccinate and how to educate them. This includes who should do the educating and what information should be included for this population. In addition, the impact on adolescent vaccination on attitudes towards adult vaccination is unknown. For example, the attempted mandates for HPV vaccination for school attendance have created controversy in some states [10,37,38]. It will be interesting to see how this mandate controversy will impact adult women's acceptability and uptake of the HPV vaccine.

The majority of studies included in this review used a single mode of measurement when assessing acceptability. It is possible that using only single measures does not address all aspects of acceptability. Future studies should employ multiple measures of acceptability to help better define influences of acceptability. In addition to this limitation, some terms were used in studies that have not been defined such as “too late” to get the vaccine and “perceived risk” of HPV [19,25,26]. Qualitative studies should be conducted to define these terms and understand their meaning to help researchers better understand the barriers to vaccination in this age group. Once a definition for “risk” has been established, an area of future research should focus on helping women in this age range determine their level of risk for HPV infections and cervical cancer, so that they can make informed decisions regarding vaccination and other health behaviors.

Although all of these studies provide information about possible influences of vaccine acceptability, none of the studies investigated what aspects of the vaccine weighed most in the participants’ decision to accept. In two studies that investigated parental attitudes toward STI vaccines, conjoint analysis was used to determine which factors in the decision affected acceptability the most [39,40]. A weakness in this literature is that conjoint analysis has not been used to investigate what aspects weigh more heavily on a women’s decision to accept the HPV vaccine.

Finally, although acceptability studies are important because they help determine general interest and possible initial strategies, acceptability and uptake are not perfectly correlated. Although vaccine acceptability in these studies was high, the vaccine is not currently licensed for this population so actual acceptance rates and uptake may not be the same as those found in these studies. Barriers and access contribute to the willingness to get the vaccine and actual uptake, and it will be important to identify the barrier and access issues over time. Once the vaccine is licensed for this age group, additional studies will need to be conducted to assess actual uptake.

4. Conclusion

These studies suggest that vaccinating adult women for HPV is likely to be acceptable if sufficient information about the virus and the vaccine is provided, and the vaccine is provided at an affordable cost. The sexual transmission of HPV may play a role for some but not most women, but it may lead women who are older or in monogamous relationships to feel less at need of the vaccine. However, addressing the potential implementation issues will be critical to insure widespread uptake.

References


