What factors are associated with male acceptance of the human papillomavirus vaccine?

Stacey Marie Boswell
The University of Toledo

What Factors are Associated with Male Acceptance of the Human Papillomavirus Vaccine?

Stacey Marie Boswell

The University of Toledo

2012

Dedication

I want to dedicate my scholarly project to my husband and family. They have shown me unconditional love and support throughout my graduate education and completion of this project. I am grateful for the support and motivation they have given me.

Acknowledgements

I would like to thank Dr. Susan Batten for her guidance and support throughout the completion of this project. Her careful editing and encouraging words are appreciated. I would also like to acknowledge the staff at the University of Toledo library and thank them for assisting me during the research phase of my project.

Table of Contents

I. Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States (Allen, Fantasia, Fontenot, Flaherty, & Santana, 2009). The virus is passed from one individual to another most frequently through direct, skin-to-skin genital contact. Epidemiologic studies suggest that 50% of all people who are sexually active will become infected with HPV at some point in their lives (U.S. Centers for Disease Control and Prevention [CDC], 2012b). The virus exists as more than 150 different related viruses (National Cancer Institute [NCI], 2011). High-risk or oncogenic types of HPV cause cervical, vaginal, and vulvar cancers in women. These types have also been shown to cause penile cancer in men and a substantial proportion of oropharyngeal and anal malignancy in men and women. Low-risk or nononcogenic types of HPV cause anogenital warts (Barroso & Wilkin, 2011). Several HPV strains are regularly identified as causes for common health consequences of HPV infection. Strains 16 and 18 have been identified as causing about 70% of cervical cancer cases and are considered high-risk or oncogenic. Strains 6 and 11 have been identified as causing about 90% of genital wart cases in men and women and are considered low-risk (Jones & Cook, 2008). Equally dangerous, HPV infection remains asymptomatic in many individuals. Without clear symptoms of infection, HPV continues to be spread unsuspectingly from one sexual partner to another.

Preventing HPV infection is vital to decreasing infection rates in both genders because no cure is available. Clearly, the most effective method to prevent HPV infection is abstinence from sexual activity. If an individual chooses to be sexually active, limiting the number of sexual partners and using condoms regularly and correctly can decrease risk of HPV infection.

Prophylactic vaccination to protect against the most common types of HPV infection is an effective method of prevention for the sexually active individual.

Two vaccines are available to protect against HPV infection. Cervarix is a bivalent vaccine targeting HPV types 16 and 18. The U.S. Food and Drug Administration (FDA) approved Cervarix for use in females age 9 to 25 years for prevention of cervical cancer caused by HPV types 16 and 18. Cervarix has not been approved for use in males. Gardasil is a quadrivalent vaccine targeting HPV types 6, 11, 16 and 18. FDA approved Gardasil for use in females for prevention of cervical cancer and some vulvar and vaginal cancers caused by HPV types 16 and 18. Gardasil is also approved for use in males and females for prevention of anal cancer and precancerous anal lesions caused by HPV types 16 and 18. In October 2009, Gardasil was approved for females and males age 9 to 26 years for prevention of genital warts caused by HPV types 6 and 11 (NCI, 2011).

In October 2011, CDC's Advisory Committee on Immunization Practices (ACIP) updated recommendations for male vaccination. Current ACIP recommendations are routine quadrivalent HPV vaccination for males age 11 to 12 years and catch-up vaccination of males age 13 to 21 years who have not been vaccinated previously. Males age 22 to 26 years may also be vaccinated against HPV. These recommendations replace the October 2009 ACIP recommendation that HPV vaccine may be given to males age 9 to 26 years (CDC, 2012).

Although both vaccines protect against specific HPV infections, it is important to understand that neither vaccine can eradicate existing HPV infection. Therefore patients should be encouraged to receive the vaccine before engaging in sexual activity. Vaccination can still be beneficial after sexual activity has begun by protecting a patient from other strains of HPV.

Vaccines play a major role in the public health approach to control infectious diseases. For a vaccination program to be successful, a vaccine must be available and accepted by the public. Numerous factors are associated with public acceptance of a vaccine. Several studies have been done to evaluate which factors are most influential in this acceptance. This paper will focus on factors most likely affecting male acceptance of the HPV vaccine.

Knowledge of influential factors is important because since FDA approval, HPV vaccination rates have remained low. The 2010 National Health Interview Survey reported only 20.7% of females age 19 to 26 years received one or more doses of HPV vaccine. This data represents a 3.6% increase in vaccination coverage from 2009 (CDC, 2012). The stagnation in female immunization rates warranted the ACIP recommendation to immunize males with the quadrivalent vaccine (Barry, 2012b). Data from 2010 National Health Interview Survey also revealed less than one percent of males age 19 to 26 years had received one or more doses of the quadrivalent HPV vaccine in 2010 (CDC, 2012).

Understanding acceptance factors and patient attitudes toward HPV vaccination is a responsibility of healthcare professionals. With this knowledge, healthcare professionals can better speak with patients about benefits of the HPV vaccine. Without this knowledge and implementation, the HPV vaccine initiative will struggle and infection rates will likely continue to rise.

Problem statement: Healthcare providers need to be informed of research findings related to male HPV vaccine acceptance and current standards for administration in order to implement these findings into clinical practice with intent to increase male participation in vaccination.

Purpose statement: The purpose of this project is to provide healthcare providers with knowledge of factors associated with male acceptance of HPV vaccination in order to better communicate with patients about benefits of HPV vaccination.

Definition of Terms:

1. Human papillomavirus (HPV)
    a. Theoretical: a group of more than 150 related viruses, of which more than 40 can be sexually transmitted, that can cause genital warts or cancer (NCI, 2011)
    b. Operational: a group of viruses, some of which can cause cancer or genital warts after sexual spread
2. Acceptance
    a. Theoretical: approving reception; belief in (*Webster's New World College Dictionary*, 2002)
    b. Operational: to receive or be willing to receive HPV vaccine
3. Prevention
    a. Theoretical: to keep from happening; made impossible by prior action; hinder (*Webster's New World College Dictionary*, 2002)
    b. Operational: protection against infection by specific HPV strains and long-term consequences of infection
4. Vaccine
    a. Theoretical: A product administered through needle injections, by mouth or by aerosol that produces immunity therefore protecting the body from disease (CDC, 2012c)

b. Operational: a product introduced into the body by needle injection to protect an individual from specific human papillomavirus types

Assumptions:

1. Current research is available in professional literature on male acceptance of HPV vaccination.
2. Healthcare professionals, including physician assistants, are interested in promoting prevention of HPV infection.

Limitations:

1. There is restriction to English language literature.
2. Literature related to epidemiology is restricted to the last 50 years for historical perspectives.
3. Literature for clinician recommendations is restricted to the past five years.
4. There is no restriction to type of literature reviewed.

Significance of Study: The significance of this project is to provide clinician recommendations for discussing human papillomavirus vaccination with male patients with intent to increase male participation in vaccination.

II. Literature Review

Human Papillomavirus

Human papillomaviruses (HPVs) are a group of more than 150 related viruses (NCI, 2011). Each HPV virus is assigned a number, called an HPV type. Different HPV types have been associated with specific cancers or symptoms. High-risk HPVs 16 and 18 are associated with cervical, vaginal, vulvar, penile, anal and oropharyngeal malignancy, while low-risk HPVs 6 and 11 are associated with anogenital warts. High-risk HPVs 16 and 18 promote disruption of normal cell-cycle control, increasing cancer risk. The papillomavirus itself is a small, non-enveloped, epitheliotropic, double-stranded DNA virus that infects mucosal and cutaneous epithelia (International Agency for Research on Cancer [IARC], 2007).

HPV infection is very common. The most common mode of horizontal transmission of anogenital HPV is by sexual activity through contact with infected cervical, vaginal, vulvar, penile or anal epithelium. Vertical transmission of HPV can occur during delivery causing respiratory papillomatosis in the newborn, although rare.

The body's immune system mounts an immune response to HPV infection. Antibody response to HPV infection is type-specific. The two prophylactic vaccines available to protect against HPV infection are type-specific as well. Cervarix protects against HPV types 16 and 18. Gardasil protects against HPV types 6, 11, 16 and 18. Both vaccines elicit a strong and sustained type-specific response (IARC, 2007).

Symptoms of HPV infection vary greatly. Infection causing genital warts results in flat, raised or cauliflower shaped growths in the genital area (American Cancer Society [ACS], 2012). Other HPV types can remain asymptomatic. Asymptomatic infection is of major concern as

individuals are likely unaware of their infection and may continue to spread the virus to other sexual partners.

Human Papillomavirus Infection Rates in Males

Human papillomavirus is the most common sexually transmitted infection in the United States (Allen et al., 2009). It is estimated about 1 million American men have genital warts caused by HPV and annually about 2 out of every 1,000 men in the United States are newly diagnosed (U.S. Food and Drug Administration, 2009). HPV infection rates have also been found to be high in asymptomatic males. Approximately half of males with no history of genital warts participating in a study by Nielson et al. (2007) were positive for at least one oncogenic or nononcogenic HPV type after sampling six anogenital sites and a semen sample. With epidemiologic studies suggesting 50% of all people who are sexually active will become infected with HPV at some point in their lives, prophylactic vaccination is crucial for reducing the incidence and prevalence of HPV infection rates in males (CDC, 2012b).

Current Vaccine Recommendations for Males

In October 2011, ACIP updated recommendations for male HPV vaccination to routine HPV vaccination for males age 11 to 12 years and catch-up vaccination of males age 13 to 21 years who have not been vaccinated previously. Males age 22 to 26 years may also be vaccinated against HPV. These recommendations replace the October 2009 ACIP recommendation that HPV vaccine may be given to males age 9 to 26 years (CDC, 2012b).

Focusing routine vaccination on males age 11 to 12 years is a result of immunobridging studies. Immunobridging is a concept in which antibody titers generated after vaccination in young adolescents are the same or higher than generated in HPV-naive subjects (Harper, 2009). A randomized, double-blind, placebo-controlled, multicenter study (Reisinger et al., 2007)

explored immunogenicity and immunobridging of the vaccine in males. 567 males received quadrivalent vaccination as study participants. A strong immune response was seen in both the 9 to 15 years and 16 to 26 years age groups, demonstrating immunogenicity. Boys age 9 to 15 years showed two to threefold higher antibody titers to vaccine strains than the 16 to 26 years age group. Given the more robust immune response in the lower age group and the fact that vaccination shows no protection against a given strain once infection is established, Barroso and Wilkin (2011) recommend routine vaccination be targeted for the lower age group in order to complete vaccination before the age of sexual debut. Targeting vaccination for this younger population allows for maximum vaccine benefits.

Benefits of Vaccination

Vaccination in males is beneficial for prevention of genital warts caused by HPV strains 6 and 11and anal cancer caused by strains 16 and 18. Although the only personal benefits of vaccination in males are decreasing the burden of genital warts and anal cancer, another benefit of widespread vaccination of males is increasing herd immunity. Herd immunity occurs when there is a reduction in vaccine-preventable illness through directly protecting those vaccinated as well as the indirect protection of others in the community (Nandwani, 2010). Herd immunity would likely result in fewer HPV infections of vaccine serotypes and fewer transmission events to susceptible females (Barroso & Wilkin, 2011). This would lower HPV related disease burden in females.

More recent studies suggest other potential benefits of male vaccination may include prevention of certain oropharyngeal and penile cancers caused by HPV strains 16 and 18 (Barroso & Wilkin, 2011). Although squamous cell cancers of the penis have a low association with HPV, basaloid cancers have a strong association with HPV infection. Similarly, while most

oral cancers are associated with alcohol and tobacco use, a subset of oral cancers is associated with HPV infection (Palefsky, 2010). Further studies are necessary to determine efficacy of the vaccine against these HPV associated cancers.

Male Human Papillomavirus Vaccination Rates

Since the ACIP recommendation to vaccinate males, the CDC assessed adult vaccination coverage for Gardasil using data from the 2010 National Health Interview Survey. Data revealed less than one percent of males age 19 to 26 years had received one or more doses of the quadrivalent HPV vaccine in 2010 (CDC, 2012b). The CDC also reports coverage with at least one dose among males age 13 through 17 years was less than 2% in 2010 (CDC, 2011).

Low vaccination rates in males reinforces the need to review research findings related to male HPV vaccine acceptance in order to implement these findings into clinical practice with intent to increase male participation in vaccination. These findings will aid healthcare providers communicate better with patients about benefits of HPV vaccination.

Attention to and promotion of HPV vaccination is important to increase vaccination rates. Healthy People 2020 is a national initiative providing science-based, ten-year objectives for improving the nation's health. This initiative includes objectives for immunizations and infectious disease. A goal was set for 80% coverage of three doses of HPV vaccine for females by age 13 to 15 years. Healthy People 2020 does not present a goal for male HPV vaccination (U.S. Office of Disease Prevention and Health Promotion, 2012).

Factors Affecting Human Papillomavirus Vaccine Acceptance in Males

In order to enhance vaccine acceptability and increase participation, factors influencing individual decision-making need to be reviewed to determine which factors play the largest role

in vaccine acceptability. With this knowledge, healthcare providers will be better equipped to discuss human papillomavirus vaccination with male patients.

Demographics

Study data differ as to correlation between demographics and vaccine acceptance. A Georgia based study by Ferris et al. (2009) was conducted prior to FDA approval of vaccination for males included males age 18 to 45 years. Study participants completed a questionnaire after reading a one page information sheet about HPV and the vaccine. The purpose was to determine correlates of HPV vaccine acceptance among men. Results revealed males age 18 to 29 years were more willing to receive the vaccine than older age groups, but the greatest percentage of the study population remained undecided about receiving the vaccine. Men who did not want to get the vaccine were older, black, and had a lower education level. Positive correlates for vaccine acceptance were being a college graduate or Hispanic.

Studies conducted in The Netherlands and South Australia also identified a positive correlation between younger age and vaccine acceptance present in the study by Ferris et al. A cross-section survey led by Lenselink et al. (2008) in The Netherlands of males age 18 to 25 years identified vaccine acceptance to be positively influenced by younger age. Self-administered questionnaires without supplemental HPV related information were utilized. A telephone based survey by Marshall, Ryan, Roberton, and Baghurst (2007) in South Australia evaluated community attitudes of HPV vaccination in residents 18 years and older. Vaccine was indicated for males age 9 to 15 years at the time of the study. Results revealed 18 to 24 year old respondents were more likely to agree to vaccination than those who were 45 to 54 years old.

Correlation of demographics and vaccine acceptance was not demonstrated in a United States based study by Jones and Cook (2008). Participants were recruited by convenience

sampling at a northeastern university and asked to complete a questionnaire to examine intent to receive HPV vaccine. Intent was not significantly associated with age or race after statistical analysis for vaccine acceptance. A similar study by Gerend and Barley (2009) conducted prior to FDA approval of male vaccination focused on heterosexual male college students. Participants completed a baseline survey, were given a two-page intervention message on HPV infection and the HPV vaccine, and asked to complete a posttest survey. Participants were randomly assigned to receive one of two intervention messages: a self-protection message or a self-protection and partner protection message. No demographic correlates were identified with statistical analysis. HPV knowledge and vaccine acceptance of heterosexual men age 18 to 59 years was evaluated utilizing a national online survey by Reiter, Brewer, and Smith (2010) prior to FDA vaccine approval. This study sample consisted mostly of men outside the likely targeted age range for HPV vaccination in males; acceptance did not differ across age groups.

Vaccine Safety, Efficacy, and Adverse Reactions

Important considerations influencing men's attitudes and acceptance of the HPV vaccine include vaccine safety, efficacy and adverse reactions. Ferris et al. (2009) reported that men who were extremely concerned about vaccine safety were more likely to want the HPV vaccine. Ferris et al. suggest these same men may have been extremely concerned or worried about the risks of HPV infection and, therefore, for them vaccination is preferable. Men undecided about receiving the HPV vaccine were more likely not worried about vaccine side effects nor concerned about vaccine safety. These findings can benefit future marketing and education efforts about receiving the vaccine.

Allen et al. (2009) examined men's knowledge and attitudes toward HPV vaccination at a time when the vaccine was anticipated to soon be available for males in the United States. Allen

et al. hoped to gain a better understanding of men's knowledge and attitudes to aid in development of effective population-based intervention strategies. Six focus groups of students age 18 to 22 years were audiotaped, transcribed and analyzed. Qualitative analysis involved development of initial coding categories and predominant emergent themes reflected from higher-order categories. Outcomes revealed concerns about safety and efficacy of the vaccine are strongly associated with vaccine intentions. When asked about receiving the vaccine if it became available to men, apprehension concerning safety and side effects of the vaccine was voiced by participants.

Male focus groups age 18 to 55 years were utilized as well in a study in Malaysia by Wong (2010). This study is important in several ways. Since men are key decision makers in eastern societies like Malaysia, it was prudent to discover their knowledge and attitudes in order to enhance involvement in the vaccination initiatives for women as well. Outcomes revealed men's attitude of HPV vaccination for themselves and their offspring was related to efficacy of the HPV vaccine. Participants expressed need for more information on safety, efficacy and possible immediate or long-term side effects of the vaccine.

Influential factors on HPV vaccine acceptance among Filipino men age 18 to 31 years was studied by Young et al. (2011). Cross-sectional surveys were completed by study participants after being informed HPV was sexually transmitted and a major cause of cervical cancer and genital warts. Outcomes identified vaccine safety was an influential factor in vaccine acceptance for 54.65% of study participants.

A South Australian study by Marshall et al. (2007) evaluated potential concern regarding vaccine safety and side effects. Respondents identified concerns about use of HPV vaccine in their children as well as themselves in relationship to safety and side effects of the vaccine as

well as need for more education prior to a vaccine program being established. Interestingly, 70.6% of men were concerned about side effects of the vaccine compared to 62.6% of women.

Sexual Activity

Several studies reported sexual activity had an impact on male acceptance of HPV vaccination. Ferris et al. (2009) study of males age 18 to 45 compared men's sexual history with HPV vaccine preferences. Men who were not currently sexually active were more likely to want the HPV vaccine; however, male virgins were more likely to be undecided about vaccination. This finding highlights an important challenge in educating virgin males about the ideal time to receive vaccination for maximum protection. Men with a history of more than ten female sexual partners were also more likely to want the HPV vaccine. It is reassuring to see an understanding of vaccination for such a high-risk group; however, the potential of prior HPV exposure and infection limits vaccine benefits.

Gerend and Barley (2009) focused on heterosexual male college students' vaccine acceptance after reading either a self-protection intervention message or a self-protection and partner protection intervention message. Higher levels of HPV vaccine acceptance were associated with being sexually active, having a current sex partner, having a greater number of lifetime sex partners, and receiving a previous sexually transmitted infection test. It should be noted sexual history information of participants was gathered prior to receiving either intervention message.

Comparable results were observed in Reiter et al. (2010) national study of heterosexual men age 18 to 59 years. Of the 37% of study participants willing to receive HPV vaccination, more men were willing to get the vaccine if they reported five or more lifetime sexual partners. With 67% of men in the study married or living with a partner, further investigation is needed

with men who are not married or living with a partner to investigate potential correlation between sexual activity and vaccine acceptance for this population as well.

Correlation between number of sexual partners and vaccine acceptance was statistically significant in a United States study by Jones and Cook (2008). Men age 18 to 32 years were surveyed. Men were more likely to accept an HPV vaccine if they had more than five sexual partners. Compared with men who had no sex partners, men with one or two sex partners were five times more likely, those with three to five partners were fourteen times more likely, and those with more than five partners were nine times more likely to accept the vaccine.

A Dutch study of males age 18 to 25 years by Lenselink et al. (2008) determined people reported no association between sexual activity status or number or sexual partners and vaccine acceptance. Whether participants were currently sexually active or not, no statistically significant difference was identified relating to vaccine acceptance. The number of sexual partners was also not statistically significant.

Knowledge of HPV

Although several studies provided HPV information prior to completion of surveys or questionnaires for vaccine acceptance, most collected baseline data on knowledge of HPV prior to information distribution. Gerend and Barley (2009) assessed knowledge of HPV on both the baseline survey and posttest. The assessment consisted of nine items with “true,” “false” or “don’t know” answer options. “Don’t know” responses were coded as incorrect. Knowledge about HPV and infection consequences was low at baseline for the majority of assessment items as shown in Appendix, Table 1. There was considerable confusion between genital warts and genital herpes and less than 25% were aware of the connection between HPV and anogenital cancers in men (Gerend & Barley, 2009). Knowledge scores increased substantially from

baseline to posttest; however, confusion seemed to remain about the relationship between genital warts and genital herpes. The percentage of participants with correct answers was nearly 100% for most items. Only 75% of participants answered “There is a vaccine to prevent HPV infection that is available for women” correctly. This is noteworthy as the vaccine initiative still struggles in the female population as healthcare providers try to spread awareness and improve vaccination rates for males. Gerend and Barley (2009) identified higher levels of HPV vaccine intention associated with greater HPV knowledge of participants.

Knowledge and awareness of HPV was also assessed by Reiter et al. (2010). The HPV knowledge questionnaire consisted of nine items similar to those in Gerend’s study. Sixty-one percent of men reported hearing of HPV prior to the survey, but their HPV knowledge was low with a mean number of 3.5 correct responses out of 9. Overall, 39% of men were unaware of HPV and 42% were aware but had low knowledge scores. The majority of men knew HPV is a sexually transmitted infection and is a common infection; however, only 45% knew HPV causes health problems for males. Merely 34% knew HPV can cause genital warts. Percentage of participants knowledgeable about HPV related cancers was even less. Just 14, 21 and 17% of men knew HPV can cause anal, oral and penile cancers, respectively. Compared to participants with high HPV knowledge, vaccine acceptability was lower among participants who had not heard of HPV and those with low knowledge. Low awareness and knowledge scores for many men indicate a great need for further education about HPV and infection consequences in order to raise vaccination rates.

Gottvall, Larsson, Hoglund, and Tyden (2009) investigated knowledge of HPV and attitudes toward vaccination using classroom questionnaires with Swedish high school students age 15 to 16 years. Knowledge of HPV and HPV vaccine was addressed with fourteen items.

Eighty-eight percent of students answered questions regarding HPV knowledge with “Don’t know.” Only 9.6% of boys had ever heard of HPV and 3.8% recognized men can contract HPV. Knowledge of the virus and the vaccine was the only factor associated with intention to be vaccinated. This association reinforces the importance of education and awareness for the male population in order to increase vaccination.

A United States study of university men by Jones and Cook (2008) also evaluated knowledge of HPV by asking participants to agree or disagree with three statements: “HPV can be asymptomatic” (true), “HPV can spontaneously resolve completely without treatment” (true), and “Greater than 50% of sexually active college students will have HPV once during college” (true). Statistical analysis indicated men were significantly more likely to accept HPV vaccine if they had greater HPV knowledge. Participants who answered two or three knowledge questions correctly were three times more likely to accept the vaccine compared with those answering zero or one knowledge question correctly.

Associated Stigma and Perceived Norms

Vaccine acceptance seems to be related to perceived norms and stigma associated with the HPV vaccine. Gerend and Barley (2009) indicated men who believed their friends will get vaccinated reported higher intentions to get vaccinated themselves, suggesting peer behavior may play an important role in HPV vaccine uptake among young adult males. Acceptance of the vaccine by peers aids in perception of vaccination as a norm and standard practice.

Similarly, in the study by Ferris et al. (2009) participants identified a stigma linked with vaccination as nine of 571 participants noted a reason for not wanting to receive the prophylactic HPV vaccine as “embarrassment of getting a vaccine that is for sexually transmitted infection.”

Education and standardized administration of the vaccine may combat this stigma and embarrassment.

Friedman and Shepeard (2007) utilized thirty-five focus groups in six United States locations to explore knowledge, attitudes, beliefs and communication preferences of the general public regarding HPV. Each focus group consisted of nine participants ranging in age from 25 to 45 years. This study was conducted in 2003 as part of the CDC's Division of STD Prevention's research on STDs, well in advance of HPV vaccine licensure. Analysis of group discussions revealed barriers to vaccination that included fear others might think one is promiscuous if receiving a vaccine against an STD. This STD associated stigma can be a significant obstacle for normalizing vaccination. If normalizing vaccination and diminishing STD associated stigma can be achieved, discussion of sexual health may become more open as well.

Perceived Susceptibility

Health beliefs include perceived susceptibility and influence vaccine acceptance. Gerend and Barley (2009) assessed perceived susceptibility to HPV infection with two items: "How likely is it that you will get genital HPV in the future?" and "in the next ten years?" with a Likert scale anchored with "1=very unlikely" to "6=very likely." Statistically significant correlation was observed between perceived susceptibility and vaccine acceptance, with perceived susceptibility to HPV infection identified as an independent predictor of HPV vaccine acceptance.

Similar findings were reported in both Reiter's study and Friedman's focus group investigation. Men in the study by Reiter et al. (2010) willing to be vaccinated reported higher levels of concern about getting HPV-related disease and perceived likelihood of getting HPV-related disease. Focus group members demonstrated low perceived susceptibility to HPV

infection as a barrier to vaccine acceptance. Focus group members who were married did not view themselves as susceptible and thus did not see a need for vaccination (Friedman & Shepeard, 2007).

Jones and Cook (2008) also examined perceived susceptibility by asking participants to indicate what they thought their chances were of contracting HPV and forming a complication from HPV should they become infected. Greater perceived risk was associated with an increased likelihood of intention to receive the vaccine. Although correlation between perceived susceptibility and vaccine acceptance was not specifically identified in the study by Young et al. (2011) results report less than 10% of study participants believed they were susceptible to HPV or genital warts.

Marshall et al. (2007) observed a relationship between perceived susceptibility of HPV infection and vaccine acceptance. Parents who indicated they did not require the vaccine for themselves but would recommend it for their children were more likely to be married and in a monogamous relationship. Marriage and monogamy lowered participant's personal perceived susceptibility to HPV infection and likelihood of vaccine acceptance, but they still expressed wishes to protect their children through vaccination.

Chelimo, Wouldes, and Cameron (2010) examined perceived susceptibility of HPV infection in male and female undergraduate New Zealand university students. Study participants completed anonymous questionnaires after viewing a one minute HPV vaccine television commercial. Concern of future personal HPV infection risk was assessed by asking participants, "How concerned are you about being infected with HPV?" Response options were "not at all," "somewhat concerned" and "very concerned." Although outcomes reported just 22% of males were concerned about being infected with HPV, 98% of participants concerned about future

personal HPV infection risk reported they would accept free HPV vaccination. This low level of perceived susceptibility to HPV infection demonstrates need for further education and awareness.

Perceived susceptibility was the biggest influential factor in vaccine acceptance in an Australian study by McClelland and Liamputtong (2006). The study involved fourteen in-depth interviews with young men and women age 18 to 23 years. Participants were asked what they believed their estimated future risk of infection to be and to analyze their current situation, namely, whether or not they were in stable monogamous relationships. Participant's current situation had a large impact on perceived susceptibility and acceptance of the vaccine. McClelland and Liamputtong reported those in monogamous relationships had lower perceived susceptibility and viewed the vaccine as being of no value and, therefore did not consider or discuss the vaccine. Another factor that influenced perceived susceptibility was previous history of HPV or other sexually transmitted infections.

Perceived Benefit

Perceived benefit is another health belief. Gerend and Barley (2009) examined how male vaccine acceptance is influenced by one of two intervention messages based on vaccine benefits. Study participants received either a self-protection message or a self-protection and partner message. The self-protection message described the consequences of HPV for men's health including genital warts and penile and anal cancers. The self-protection and partner message described the consequences of HPV for men's health plus their female sexual partner's health including cervical cancer and genital warts. Outcomes identified perceived benefit as an independent predictor of HPV vaccine acceptance; however, no statistically significant difference was observed between the two intervention message groups. Gerend and Barley state

further research is needed to investigate the extent to which partner protection issues play a role in HPV vaccination decision-making among men.

DiClemente, Crosby, Salazar, Nash, and Younge (2011) studied vaccine intention in males age 18 to 24 years in southern United States following FDA approval of Gardasil for males. Male intent to be vaccinated against HPV was investigated as a function of promotion message. Intent was assessed using pretest and posttest assessment of one item: “Because the HPV vaccine is now available for use in men, how likely would you get the HPV vaccine within the next year?” with a Likert scale anchored with “1=very unlikely” to “6=very likely.” After completing pretest assessment, study participants viewed a brief media presentation corresponding to one of three promotion messages. Each promotion message focused on different vaccination benefits. Promotion messages included an altruism protection benefit in averting cervical cancer for sexual partners, a personal sexual protection benefit in averting genital warts, and a personal cancer protection benefit in averting head and neck cancers. Study participants completed a posttest assessment following delivery of the promotion message. The overall mean pretest vaccine intent score was 3.19 whereas the overall mean posttest vaccine intent score was 3.91. This 0.72 increase on the 6-point Likert scale is important; however, no statistically significant difference was observed in the mean posttest measure of intent between the three promotion message groups.

Cost

Vaccine cost is another factor influencing vaccine acceptance. Gerend and Barley (2009) reported cost of HPV vaccine as an independent predictor of HPV vaccine acceptance. Swedish students identified high cost of the vaccine as an obstacle to vaccination in the study by Gottvall

et al. (2009). Vaccination may become a social issue as 41.8% of males indicated vaccine cost as the largest obstacle to vaccination.

Australian men in the study by McClelland and Liamputtong (2006) discussed cost as a major factor in vaccine acceptance as well. Vaccine cost was especially important for full-time students and younger participants who earned lower incomes than other study participants. The affordability of the vaccine is important as the target population for vaccination includes younger populations with lower incomes.

Vaccine cost was an important factor in the study by Jones and Cook (2008) as 65% of study participants were “much more likely to accept the vaccine” if it was available at no cost. Having to pay fifty dollars for the vaccine made 63.3% of study participants “much less likely to accept the vaccine.”

HPV vaccination intentions were explored by Daley et al. (2010) using a convenience sample recruited from undergraduate students in Florida. Study participants completed questionnaires assessing vaccination intention related to multiple factors including vaccine cost. Results identified high cost would prevent 59.5% of respondents from being vaccinated against HPV.

The ACS (2012) explains HPV vaccine cost for drug companies to be around $130 per dose; however, patients encounter additional charges for administration of vaccine that may add up to $500 or more. Many insurance plans cover vaccination cost, but patients must verify with their specific plan.

Assistance programs are available for those who do not have insurance, are underinsured or cannot afford vaccination. Vaccines for Children (VFC) is a federal program to cover vaccine costs for children and teens who do not have insurance or who are underinsured. The VFC

program provides free vaccines to children and teens who are either Medicaid-eligible, American Indian or Alaska Native, or uninsured (ACS, 2012). Assistance is available for those 19 years and older as well through the Merck Vaccine Patient Assistance Program (Merck, 2011). Healthcare providers need to be aware of available assistance programs in order to refer eligible patients for their services.

Healthcare Provider Recommendation

Vaccine acceptance appears to be positively influenced when healthcare providers recommend vaccination. Healthcare provider recommendation was identified to be related to vaccine intention in the study by Daley et al. (2010). Recommendation for HPV vaccination from a healthcare provider was very important in vaccination decision-making for 60.8% of study participants.

Jones and Cook (2008) examined likelihood of receiving HPV vaccine related to healthcare provider recommendation by asking participants whether the following would make them more or less likely to get the vaccine: “The HPV vaccine was recommended to me by my doctor, spouse, partner or friend.” The researchers identified 42.4% of participants were “much more likely to accept the vaccine” with a doctor’s recommendation for vaccination. Recommendation for vaccination by a spouse positively influenced vaccine acceptance for 29.7% of participants; partner recommendation positively influenced 24.1%, and friend recommendation positively influenced 18.5% of participants. Doctor recommendation positively influenced the greatest percentage of study participants for vaccine acceptance.

More than half of men in the study by Ferris et al. (2009) stated they would be more inclined to receive the vaccine if recommended by a doctor. Reiter et al. (2010) also investigated vaccine acceptance related to healthcare provider recommendation; acceptance was higher for

males who believed their doctor would recommend they get vaccinated. However, only 3% of study participants reported talking to a doctor previously about getting HPV vaccine for themselves. With a positive correlation between vaccine acceptance and healthcare provider recommendation for vaccination, communication between patient and provider must be trusted and present in order to increase vaccination rates.

III. Methodology

This project was a review of current literature intended to provide healthcare professions with knowledge of the factors associated with male acceptance of the HPV vaccine.

Databases used to collect articles included PubMed, CINAHL, and PsycINFO. Key search terms included “human papillomavirus,” “HPV,” “vaccine,” “acceptance,” “male,” “attitude” “Gardasil,” and “infection.” First tier information included original research studies. Second tier information included review articles. Third tier information included lay literature.

IV. Summary of Results

Purpose statement: The purpose of this project is to provide healthcare providers with knowledge of factors associated with male acceptance of HPV vaccination in order to better communicate with patients about benefits of HPV vaccination.

Findings:

A. **Demographics.** Study results differed as to correlation between demographics and vaccine acceptance. Ferris et al. (2009), Lenselink et al. (2008), and Marshall et al. (2007) identified vaccine acceptance to be positively influenced by younger age. No statistically significant difference was reported related to demographics by Jones and Cook (2008) or Gerend and Barley (2009). Reiter et al. (2010) also identified vaccine acceptance did not differ across age groups.

B. **Vaccine Safety, Efficacy, and Adverse Reactions.** Researchers identified concern about vaccine safety, efficacy, and adverse reactions to be influential in vaccine acceptance. Allen et al. (2009), Wong (2010), Young et al. (2011) and Marshall et al. (2007) reported study participant concern about safety and efficacy of HPV vaccine is strongly associated with vaccine intentions. Study participant concern resulted in apprehension to HPV vaccination. Ferris et al. (2009) reported men who were extremely concerned about vaccine safety were more likely to want HPV vaccination.

C. **Sexual Activity.** Ferris et al. (2009), Gerend and Barley (2009), Reiter et al. (2010) and Jones and Cook (2008) reported increased vaccine acceptance associated with a greater number of lifetime sexual partners. Ferris et al. (2009) identified men who were not currently sexually active were more likely to want HPV vaccination;

however, Gerend and Barley (2009) reported higher levels of vaccine acceptance associated with being sexually active and having a current sexual partner. Ferris et al. (2009) also reported male virgins were likely to be undecided about vaccination while Jones and Cook (2008) identified this population to be less likely to accept HPV vaccination. Lenselink et al. (2008) reported no statistically significant difference between sexual activity status or number of sexual partners and vaccine acceptance.

D. **Knowledge of HPV.** Although overall knowledge of HPV was low among study participants, Gerend and Barley (2009), Reiter et al. (2010), and Jones and Cook (2008) identified higher levels of HPV vaccine acceptance associated with greater HPV knowledge. Gottvall et al. (2009) reported knowledge of the virus and vaccine was the only factor associated with intention to be vaccinated.

E. **Associated Stigma and Perceived Norms.** An STD associated stigma was identified as a barrier to HPV vaccine acceptance by Ferris et al. (2009) and Friedman and Shepeard (2007). Gerend and Barley (2009) identified increased vaccine acceptance related to perception of vaccination as a norm as men reported higher intentions to be vaccinated if they believed their friends would be vaccinated.

F. **Perceived Susceptibility.** Gerend and Barley (2009) identified a statistically significant correlation between perceived susceptibility and vaccine acceptance. Reiter et al. (2010), Jones and Cook (2008). and Chelimo et al. (2010) reported increased vaccine acceptance associated with greater perceived susceptibility of HPV infection. Low perceived susceptibility to HPV infection was identified as a barrier to HPV vaccination by Friedman and Shepeard (2007). Marshall et al. (2007) and McClelland and Liamputtong (2006) reported low perceived susceptibility to HPV

infection and low vaccine acceptance were associated with study participants who were married or in monogamous relationships.

G. **Perceived Benefit.** Gerend and Barley (2009) and DiClemente et al. (2011) reported perceived benefit of HPV vaccination as a significant factor positively affecting vaccine acceptance; however, no statistically significant differences were observed between intervention message groups in either study.

H. **Cost.** Gerend and Barley (2009), McClelland and Liamputtong (2006), and Jones and Cook (2008) identified cost of HPV vaccine as a major factor in HPV vaccine acceptance. Gottvall et al. (2009) and Daley et al. (2010) reported high cost of the vaccine as an obstacle to HPV vaccination.

I. **Healthcare Provider Recommendation.** Daley et al. (2010) identified recommendation for HPV vaccination by a healthcare provider to be very important in vaccination decision-making for study participants. Study results from Jones and Cook (2008), Ferris et al. (2009), and Reiter et al. (2010) report higher vaccine acceptance among study participants if recommended by a healthcare provider.

Discussion:

Review and interpretation of current literature on HPV vaccination identified several factors associated with male HPV vaccine acceptance while several research studies suggest no correlation for multiple factors. Demographic information of study participants was gathered in most studies; however, correlation between greater vaccine acceptance and younger age was reported in only three studies. Three other studies reported no statistically significant difference between vaccine acceptance and demographics, including age groups. This conflicting data may

be reflective of different study populations. The geographic location and age of study participants varied greatly among the studies. Future research should focus on the target population for recommended vaccination to better evaluate correlation between age and vaccine acceptance.

Results of vaccine acceptance related to vaccine safety, efficacy, and adverse reactions differed between studies as well. Although most researchers reported study participant concern generated apprehension to HPV vaccination, Ferris et al. (2009) reported higher vaccine intention associated with extreme concern about vaccine safety. Ferris et al. suggest these same men may have been extremely concerned or worried about the risks of HPV infection and, therefore, for them vaccination was preferable. Study results were unclear about the exact influence apprehension to vaccination had on vaccine intention. Researchers report apprehension was associated with vaccine intentions, but tangible data concerning vaccine uptake or denial was unavailable.

Four researchers reported increased vaccine acceptance associated with a greater number of lifetime sexual partners; however, Lenselink et al. (2008) identified no statistically significant difference between number of sexual partners and vaccine acceptance. While other studies provided participants with supplemental information prior to assessments, Lenselink et al. utilized self-administered questionnaires without providing supplemental HPV information. Researchers identified overall knowledge of HPV was low among study participants. Four researchers reported higher levels of HPV vaccine acceptance associated with greater HPV knowledge. Low HPV knowledge of study participants may have contributed to results regarding number of sexual partners and vaccine acceptance in the study by Lenselink et al. Low

awareness and knowledge scores for many men indicate a great need for further education about HPV and infection consequences in order to raise vaccination rates.

Increased vaccine acceptance was associated with greater perceived susceptibility to HPV infection in four studies; however, Marshall et al. (2007) and McClelland and Liamputtong (2006) reported low vaccine acceptance and low perceived susceptibility for study participants who were married or in monogamous relationships. This low level of perceived susceptibility to HPV infection demonstrates need for further education and awareness. Overall, perceived susceptibility to HPV infection is a potentially modifiable belief. If education and vaccine promotion is successful, individuals will be able to more accurately perceive their susceptibility, ultimately leading to greater vaccine participation.

Gerend and Barley (2009) and DiClemente et al. (2011) identified perceived benefit of HPV vaccination as a significant factor positively influencing vaccine acceptance. This is important for future marketing and educational efforts for vaccination. Most noteworthy, no statistically significant differences were observed between intervention groups in either study. These results suggest that it is not the type of vaccine prevention and benefit information provided to males, but rather providing males with any type of information can promote vaccine acceptance. The impact of personal benefit versus partner protection benefit on vaccine intent remains unclear.

Limitations are present in many of the research studies reviewed. Many studies were based on hypothetical availability of HPV vaccine for males. Factors associated with HPV vaccine acceptance may also have been affected as current recommendations for vaccination had not been approved at the time of many studies. Future research should investigate factors

associated with male acceptance of the HPV vaccine now that there is an approved vaccine and current vaccination recommendations.

Conclusion:

Factors associated with male acceptance of HPV vaccine cannot be determined based on current findings. Conclusions can be drawn that vaccine safety, efficacy, and adverse reactions are related to vaccine acceptance, but whether this association positively or negatively influences vaccine uptake remains unclear. Increased vaccine acceptance was associated with a greater number of sexual partners. Further research should investigate other attributes that impact vaccine intention. Greater HPV knowledge can lead to higher levels of HPV vaccine acceptance. An STD associated stigma was determined to be a barrier to HPV vaccination.

Higher perception of susceptibility to HPV infection increased vaccine acceptance. Vaccine cost proved to be a major barrier to vaccine acceptance. Recommendation for vaccination by a healthcare provider increased vaccine acceptance.

Recommendations for Healthcare Providers:

Members of the public turn to healthcare providers with questions and concerns about their general health. This includes information regarding HPV infection. It is the responsibility of healthcare providers to be educated and willing to discuss HPV infection with patients. Healthcare providers must be knowledgeable and current regarding HPV epidemiology, transmission, prevention, and vaccination recommendations. This may require development of HPV educational and skill-building resources to enable healthcare providers to address patients'

HPV questions and concerns (Friedman & Shepeard, 2007). Healthcare providers need to accurately inform patients in order to empower personal healthcare decisions.

HPV infection is a public health concern; healthcare providers should strive to increase male HPV vaccination rates. Healthcare providers must understand obstacles patients may face for vaccination. Being aware of and recommending available vaccine assistance programs for eligible patients is another responsibility of healthcare providers.

Communication between healthcare provider and patient should be open and trusted. Healthcare providers should openly discuss safe sexual practices, risks, and consequences of HPV infection. With the knowledge and guidance from healthcare providers, patients should be able to accurately identify personal HPV infection risk. Discussion with the target population should begin at an early age in order to inform HPV vaccination decision making. Healthcare providers should also recommend HPV vaccination to males in the approved age range. Routine recommendation of vaccination may help standardize HPV vaccination, diminish STD associated stigma, and ultimately increase vaccine participation.

Appendix

Table 1. HPV Knowledge: Number (Percent) Answering Correctly at Baseline and Posttest (Gerend & Barley, 2009)

Item (Correct Answer)	Baseline n (%)	Posttest n (%)
HPV can cause herpes. (F)	87 (24)	184 (52)
Genital warts are caused by HPV. (T)	98 (28)	326 (92)
Genital warts are caused by the herpes virus. (F)	80 (23)	140 (39)
There is a vaccine to prevent HPV infection that is available for women.	142 (40)	266 (75)
Most people with genital HPV have no visible signs or symptoms. (T)	192 (54)	339 (95)
People can transmit HPV to their partner(s) even if they have no symptoms of HPV. (T)	268 (75)	348 (98)
Having multiple sexual partners increases a person's risk of getting HPV. (T)	312 (88)	353 (99)
HPV can cause cancer of the penis or anus in men. (T)	83 (23)	347 (98)
Vaccines to prevent HPV infection for men are under development. (T)	137 (39)	349 (98)

T indicates true; F, false.

V. References

Allen, J. D., Fantasia, H. C., Fontenot, H., Flaherty, S., & Santana, J. (2009). College men's knowledge, attitudes, and beliefs about the human papillomavirus infection and vaccine. *Journal of Adolescent Health, 45*(5), 535-537. doi: 10.1016/j.jadohealth.2009.05.014

American Cancer Society. (2012). *Human papilloma virus (HPV), cancer, and vaccines--Frequently asked questions*. Retrieved March 20, 2012, from http://www.cancer.org/Cancer/CancerCauses/OtherCarcinogens/InfectiousAgents/HPV/HumanPapillomaVirusandHPVVaccinesFAQ/hpv-faq-vaccine-cost#top

Barroso, L. F., 2nd, & Wilkin, T. (2011). Human papillomavirus vaccination in males: The state of the science. *Current Infectious Disease Reports, 13*(2), 175-181. doi: 10.1007/s11908-010-0163-7

Barry, C. (2012). Preteen boys and HPV--New guidelines on HPV shot and males. *PA Professional, 4,* 26-27.

Chelimo, C., Wouldes, T. A., & Cameron, L. D. (2010). Human papillomavirus (HPV) vaccine acceptance and perceived effectiveness, and HPV infection concern among young New Zealand university students. *Sexual Health, 7*(3), 394-396. doi: 10.1071/SH10005

Daley, E. M., Marhefka, S. L., Buhi, E. R., Vamos, C. A., Hernandez, N. D., & Giuliano, A. R. (2010). Human papillomavirus vaccine intentions among men participating in a human papillomavirus natural history study versus a comparison sample. *Sexually Transmitted Diseases, 37*(10), 644-652.

DiClemente, R. J., Crosby, R. A., Salazar, L. F., Nash, R., & Younge, S. (2011). Is male intent to be vaccinated against HPV a function of the promotion message? *International Journal of STD and AIDS, 22,* 332-334. doi: 10:1258/ijsa.2011.010429

Ferris, D. G., Waller, J. L., Miller, J., Patel, P., Price, G. A., Jackson, L., & Wilson, C. (2009). Variables associated with human papillomavirus (HPV) vaccine acceptance by men. *Journal of the American Board of Family Medicine, 22*(1), 34-42. doi: 10.3122/jabfm.2009.01.080008

Friedman, A. L., & Shepeard, H. (2007). Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV: Findings from CDC focus group research and implications for practice. *Health Education & Behavior, 34*(3), 471-485. doi: 10.1177/1090198106292022

Gerend, M. A., & Barley, J. (2009). Human papillomavirus vaccine acceptability among young adult men. *Sexually Transmitted Diseases, 36*(1), 58-62. doi: 10.1097/OLQ.0b013e31818606fc

Gottvall, M., Larsson, M., Hoglund, A. T., & Tyden, T. (2009). High HPV vaccine acceptance despite low awareness among Swedish upper secondary school students. *European Journal of Contraception and Reproductive Health Care, 14*(6), 399-405. doi: 10.3109/13625180903229605

Harper, D. M. (2009). Prevention of human papillomavirus infections and associated diseases by vaccination: A new hope for global public health. *Public Health Genomics, 12*(5-6), 319-330. doi: 10.1159/000214922

International Agency for Research on Cancer. (2007). *Human papillomaviruses* (Vol. 90). Lyon, France: International Agency for Research on Cancer.

Jones, M., & Cook, R. (2008). Intent to receive an HPV vaccine among university men and women and implications for vaccine administration. *Journal of American College Health, 57*(1), 23-32. doi: 10.3200/JACH.57.1.23-32

Lenselink, C. H., Schmeink, C. E., Melchers, W. J., Massuger, L. F., Hendriks, J. C., van Hamont, D., & Bekkers, R. L. (2008). Young adults and acceptance of the human papillomavirus vaccine. *Public Health, 122*(12), 1295-1301. doi: 10.1016/j.puhe.2008.02.010

Marshall, H., Ryan, P., Roberton, D., & Baghurst, P. (2007). A cross-sectional survey to assess community attitudes to introduction of human papillomavirus vaccine. *Australian and New Zealand Journal of Public Health, 31*(3), 235-242.

McClelland, A., & Liamputtong, P. (2006). Knowledge and acceptance of human papillomavirus vaccination: Perspectives of young Australians living in Melbourne, Australia. *Sexual Health, 3*(2), 95-101.

Merck. (2011). *Paying for Gardasil*. Retrieved August 6, 2012, from http://www.gardasil.com/what-is-gardasil/hpv-and-gardasil/coverage-for-gardasil/

Nandwani, M. C. (2010). Men's knowledge of the human papillomavirus vaccine. *Nurse Practitioner, 35*(11), 32-39. doi: 10.1097/01.NPR.0000388900.49604.e1

National Cancer Institute at the National Institutes of Health. (2011). *HPV and cancer*. Retrieved February 12, 2012, from http://www.cancer.gov/cancertopics/factsheet/Risk/HPV

Nielson, C. M., Flores, R., Harris, R. B., Abrahamsen, M., Papenfuss, M. R., Dunne, E. F., . . . Giuliano, A. R. (2007). Human papillomavirus prevalence and type distribution in male anogenital sites and semen. *Cancer Epidemiology, Biomarkers & Prevention, 16*(6), 1107-1114. doi: 10.1158/1055-9965.EPI-06-0997

Palefsky, J. M. (2010). Human papillomavirus-related disease in men: Not just a women's issue. *Journal of Adolescent Health, 46*(4 Suppl), S12-19. doi: 10.1016/j.jadohealth.2010.01.010

Reisinger, K. S., Block, S. L., Lazcano-Ponce, E., Samakoses, R., Esser, M. T., Erick, J., . . . Barr, E. (2007). Safety and persistent immunogenicity of a quadrivalent human papillomavirus types 6, 11, 16, 18 L1 virus-like particle vaccine in preadolescents and adolescents: A randomized controlled trial. *Pediatric Infectious Disease Journal, 26*(3), 201-209.

Reiter, P. L., Brewer, N. T., & Smith, J. S. (2010). Human papillomavirus knowledge and vaccine acceptability among a national sample of heterosexual men. *Sexually Transmitted Infections, 86*(3), 241-246. doi: 10.1136/sti.2009.039065

U.S. Centers for Disease Control and Prevention. (2012a). *Adult vaccination coverage--United States 2010*. Retrieved April 4, 2012, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6104a2.htm#tab1

U.S. Centers for Disease Control and Prevention. (2012b). *Genital HPV infection--Fact sheet*. Retrieved February 12, 2012, from http://www.cdc.gov/STD/HPV/STDFact-HPV.htm

U.S. Centers for Disease Control and Prevention. (2012c). *Glossary*. Retrieved February 12, 2012, from http://www.vaccines.gov/more_info/glossary/index.html#v

U.S. Centers for Disease Control and Prevention. (2011). *Recommendations on the use of quadrivalent human papillomavirus vaccine in males — Advisory Committee on Immunization Practices (ACIP).* Retrieved March 20, 2012, from http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6050a3.htm

U.S. Office of Disease Prevention and Health Promotion. (2012). *Immunization and infectious diseases*. Retrieved August 6, 2012, from http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicid=23

U.S. Food and Drug Administration. (2009). *FDA approves new indication for Gardasil to prevent genital warts in men and boys*. Retrieved February 26, 2012, from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2009/ucm187003.htm

Webster's New World College Dictionary. (2002). (4 ed.): Wiley Publishing, Inc.

Wong, L. P. (2010). Role of men in promoting the uptake of HPV vaccinations: Focus groups' finding from a developing country. *International Journal of Public Health, 55*(1), 35-42. doi: 10.1007/s00038-009-0072-4

Young, A. M., Crosby, R. A., Jagger, K. S., Casquejo, E., Pinote, L., Ybanez, P., . . . Pinote, L. (2011). Influences on HPV vaccine acceptance among men in the Philippines. *Journal of Men's Health, 8*(2), 126-135.

VI. Abstract

Objective: This literature review presents factors associated with male acceptance of HPV vaccination for healthcare providers to better communicate vaccination benefits with patients. **Methods:** Current literature was reviewed from PubMed, CINAHL, and PsycINFO databases. Search terms included “human papillomavirus,” “HPV,” “vaccine,” “acceptance,” “male,” “attitude” “Gardasil,” and “infection.” **Results:** Thirty-two references were obtained and reviewed including original research, literature reviews, government publications, and lay literature. **Conclusion:** Increased male HPV vaccine acceptance is associated with greater HPV knowledge, higher perception of susceptibility to HPV infection, and healthcare provider recommendation for vaccination. The most beneficial promotion message for vaccine acceptance as well as correlation between acceptance and demographics, sexual activity, and vaccine safety, efficacy, and adverse reactions remains uncertain. Cost and an STD associated stigma were identified as barriers to vaccination. Healthcare providers are responsible for educating patients about HPV, infection risk, and recommending vaccination to the target population to increase vaccine participation.