Factors Influencing HPV Vaccination in Males

A Master’s project submitted in partial fulfillment of the requirements for the degree of

MASTERS OF NURSING

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December, 2012
To the Faculty of Washington State University:

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Abstract

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December 2012

Chair: Lorna Schumann

Journal Submission: The Journal for Nurse Practitioners

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. In addition to causing cervical cancer in females, it also causes genital warts and cancers in males. The HPV vaccine has been recently approved for use in males. This literature review explores factors that influence HPV vaccination in males. A systematic review of the CINAHL database and Google scholar and journals published from 2004 to 2011 indicate significant factors that increase vaccination likelihood are increased knowledge and awareness among patients, parents, and providers. Provider recommendations are a high priority in patient and parent acceptability of vaccine, while professional organization endorsement is important for providers. Factors that decrease likelihood include lack of knowledge and questionable cost to benefit ratio. Barriers to HPV vaccination in males include lack of knowledge and awareness, which can be remedied with increased education. Further research is needed to evaluate cost-effectiveness as new evidence of vaccine coverage, efficacy, and HPV-related morbidity surface and as recommendations change.

Key Words: Human papillomavirus, HPV vaccine, men/males
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Factors Influencing HPV Vaccination in Males

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States (US). Most sexually active people will contract one or more strains of the virus at some point in their lives (Centers for Disease Control and Prevention [CDC], 2012). HPV is the leading cause of cervical cancer in females, but the virus also afflicts males. It is less well known that HPV can cause genital warts, penile, anal, and head and neck cancers. These forms of HPV-related cancers are found in 7,500 males annually in the US (CDC, 2012). It is important to note that although anal cancer is uncommon, its incidence is rising significantly among males each year and males have lower 5-year survival rates, as compared with females suffering from anal cancer (Joseph et al., 2008).

HPV Types

There are more than 100 different genotypes of HPV (Gearhart, 2012). Some HPV types are responsible for nongenital cutaneous diseases including common warts, plantar warts, and even some squamous cell carcinomas (Gearhart, 2012). Of the more than 40 different types related to anogenital and oral mucosal disease, four stand out as the front runners in causing morbidity. According to the National Cancer Institute (NCI), 90% of anal and genital warts are caused by HPV types 6 and 11 (2012). These low-risk HPV types do not cause cancer. HPV types 16 and 18 are high-risk and cause the
majority of mucosal carcinomas, including 70% of cervical cancers and several penile, vulvar, and vaginal cancers (NCI, 2012). HPV-16, alone, has been linked to 85% of all anal cancers and more than half of HPV-associated oropharyngeal cancers (NCI, 2012). In fact, Chaturvedi et al. (2011) compared HPV-positive and HPV-negative patients (N=271) with oropharyngeal cancer in the United States, since 1984 and revealed that the incidence of HPV-positive cancers increased by 225% in just 16 years.

**HPV Vaccine**

There are currently two vaccines that are FDA-approved for the prevention of HPV: Merck and Company’s *Gardasil* and GlaxoSmithKline’s *Cervarix*. Cervarix is a bivalent vaccine which prevents HPV types 16 and 18 and is approved only for use in females at this time. Gardasil is a quadrivalent vaccine protecting against HPV types 6, 11, 16, and 18. It is given as a 3-dose series over 6 months.

In 2009, Gardasil was FDA-approved to prevent genital warts in males. It was approved for use in males, as well as females ages 9-26 (Food and Drug Administration [FDA], 2009). In 2010, the FDA approved Gardasil for prevention of HPV-associated anal cancers (FDA, 2010). The most recent recommendation from the Advisory Committee on Immunization Practices (ACIP) reflects this new indication for the vaccine. On October 25, 2011, the ACIP held a press briefing in which they publicly announced they are now recommending routine HPV vaccine administration in 11 or 12-year old males, catch-up immunization in 13 to 21-year old males, and permissive use in males ages 22 through 26 (Dunne et al., 2011). It has been shown to be beneficial to include males to not only provide herd population immunity, and to protect females from the deadly consequences of cervical cancer, but now to prevent HPV-related morbidity in
males, as well. Despite these benefits, HPV vaccination remains a controversial treatment for many patients and their families. Healthcare workers and community members need to be aware of the benefits of vaccinating males, in addition to females, as a primary prevention strategy to lower the overall health risk of HPV. The purpose of this literature review is to examine the factors that influence the willingness of patients and families to utilize the vaccine.

**Theoretical Framework**

There are several theories that describe motivation related to certain health behaviors. One theory, in particular, was chosen to provide a framework for predicting the likelihood of males to receive the HPV vaccine. This theory is Pender’s Health Promotion Model, which was introduced in 1982. The Health Promotion Model is a middle range nursing theory that incorporates ideas taken from behavioral sciences which can be used to predict why a person engages in health promoting behaviors (McEwen & Wills, 2011). There are a number of factors that influence the behavioral outcome to engage in an activity or not including perceived benefits, perceived barriers, interpersonal relationships or situational dynamics. In the case of HPV vaccination, a male’s or a parent’s perceived idea of benefits and barriers can be derived from accurate knowledge or, conversely misconceptions about the virus or the vaccine. The relationship the patient has with his parents, family, significant others as well as healthcare providers and the counsel he receives could influence his decision to be vaccinated. Furthermore, cost-effectiveness of including males in vaccine coverage is a factor relevant to not only healthcare providers and patients, but also to professional organizations that make recommendations for providers based on best practice guidelines.
Literature Review

The review of literature is organized into several sections beginning with literature search methods and segues into issues affecting vaccination.

Methods

To gather a broad assortment of data, the search began by using the WSU library website link to EBSCOhost: Advanced Search Engine CINAHL Database. Search parameters “HPV vaccine” and “males” only yielded 10 articles, so the search was broadened using the terms “human papillomavirus”, “HPV” and “men”. Over 100 results were then refined by limiting the search to peer-reviewed full text articles published from 2004 to 2012. This search provided 34 articles pertaining to the topic, but a few did not refer to vaccination at all and several were not usable research articles. To include more recent research studies, Google scholar was accessed. The descriptors “HPV” and “males” were entered and articles were limited using 2004 as the beginning publication date in the medicine, pharmacology, and veterinary science subject areas. Thirty-three more articles were obtained via Google scholar. After taking time to analyze several research studies, literature reviews, journal and news articles, 20 were selected for careful review. Thirteen news articles were eliminated because they did not include original research. Following appraisal of the articles, 15 were chosen based on their relevance to the topic. Five were discarded because they were commentaries. One study was used to supplement general information and data on oropharyngeal cancer incidence. Of these fourteen remaining articles, three research studies surveying vaccine acceptance in men, two research studies and one literature review measuring parental views, three research studies examining healthcare provider attitudes, three studies regarding vaccine safety
and efficacy, and two research studies evaluating cost-effectiveness to include vaccination for males were reviewed for this article.

**Vaccine Acceptance in Males**

Ferris, et al. (2009) conducted a correlational, quantitative study of 571 men aged 18 to 45 to determine HPV vaccine acceptance. Subjects were chosen from a convenience sample of various community gathering places in Augusta and Atlanta, Georgia. Subjects were given a 1-page information sheet on HPV and the vaccine, then asked to fill out a brief questionnaire. Subject demographics show that most surveyed were single, sexually active, heterosexual males with a high school education or higher, and had insurance coverage. More than half of subjects were white and of the Protestant faith. Results concluded that 33% would get the vaccine, 27% would not and 40% were undecided (Ferris et al., 2009). Common factors correlated with vaccine acceptance were: men with higher levels of education (p<0.0001) and more knowledge of HPV desired vaccination (p<0.0001); men with less education (p<0.001) were either undecided or did not want the vaccine. Concern over vaccine safety and side effects was more frequent in males desiring the vaccine (p<0.0001) versus those who were undecided. Willingness to receive the vaccine was increased if a healthcare provider recommended it (56.0%), if there was no cost (51.4%), and if it was proven beneficial for men (50.7%) (Ferris et al., 2009). Strengths of this study were that subjects were selected from several different locations in the community and the questionnaire was comprehensive. Weaknesses of the study were possible underrepresentation of minorities and illiterate men, as the questionnaire was written in English.
A second study was a cross-sectional analysis to assess HPV knowledge and vaccine acceptance among a national sample of heterosexual males in the US (Reiter, Brewer, & Smith, 2010). An online survey was sent to 297 men aged 18 to 59 who were members of a panel of US households. Information about HPV and the vaccine was withheld until completing the section regarding HPV knowledge. The majority of participants were non-Hispanic white, married or living with a partner, did not have a college degree, and had health insurance. Similarly to the Ferris study, Reiter, et al. (2010) found that only 37% of men were willing to get the vaccine. Correlates of vaccine acceptability included a doctor's recommendation (OR = 9.02, 95% CI: 3.45-23.60), perceived probability of disease from HPV (OR = 1.80, 95% CI: 1.02-3.17), and perceived vaccine efficacy (OR = 1.86, 95% CI: 1.22-2.83) (Reiter et al., 2010). Subjects who were unwilling had limited to no knowledge of HPV prior to taking this survey (81%) or perceived their susceptibility to contract the virus was low (mean=1.89, SD=0.63) (Reiter et al., 2010). This study is strengthened by the use of a national sample of men with varied demographic data, but limited to men with internet access, since the data was obtained via online surveys.

Reiter, Brewer, McRee, Gilbert, & Smith (2010) surveyed 306 gay and bisexual men aged 18 to 59 in the US using correlational design methods to determine correlates of vaccine acceptance. As in the study for heterosexual males, this study again used an online survey withholding HPV information until after assessing knowledge. Greater than 80% of participants were non-Hispanic white, had health insurance, and had at least 5 lifetime sexual partners. In sharp contrast to previous studies, 74% of men in this population desired HPV vaccination, most subjects had heard of HPV (73%), knew it was
a common infection (74%) and had a better idea of related health problems (58%) (Reiter et al., 2010). Acceptability was increased in males with greater than 5 lifetime sexual partners (OR = 3.39, 95% CI: 1.34-8.55), those with greater perceived vaccine efficacy (OR = 1.97, 95% CI: 1.27-3.06), and those who believed their provider would recommend vaccination (OR = 12.87, 95% CI: 4.63-35.79) (Reiter et al., 2010). An interesting finding was that only 34% of men thought their provider would recommend they get the HPV vaccine if approved for males (Reiter et al., 2010). Major strengths of this study were its inclusion of gay/bisexual men who are at a higher risk for HPV-related morbidity and using a national sample of men. The study is limited to men with internet access, which may exclude men from lower socioeconomic backgrounds.

**Parental Views of Vaccination**

Because the HPV vaccine is most beneficial to prevent HPV before first sexual contact, the focus is to vaccinate preadolescents aged 11 to 12 according to the ACIP (CDC, 2011). Children will certainly need parental consent to obtain the vaccine. Thus, it is important to examine parents’ views related to getting their sons vaccinated.

Ogilvie, et al. (2008) conducted a randomized, quantitative study of Canadian parents' willingness to have their sons vaccinated against HPV. Random digit dialing was used to recruit parents of children aged 8 to 18 across Canada. First, knowledge of HPV was assessed. Then, participants were given information regarding HPV and the vaccine and surveyed about their intention to vaccinate their children against HPV. More than half of parents had previous knowledge of HPV. Of 1381 parents of male children, 67.8% said they would have their sons vaccinated (Ogilvie et al., 2008). Factors related to positive views included awareness of HPV (AOR = 1.4, 95% CI: 1.1-2.0), high value
of healthcare provider opinions (AOR = 7.8, 95% CI: 5.8 - 10.5), intention to vaccinate a
daughter (κ = 0.9, p < 0.001) and a positive attitude towards vaccines in general (AOR =
41.5, 95% CI 9.5 - 181.7) (Ogilvie et al., 2008). Parents with a negative view perceived
that vaccination may promote risky sexual behavior (Ogilvie et al., 2008). A major
strength of this study is its large sample size. Limitations include that the study was done
in Canada and participants were asked whether they would be willing to have their sons
vaccinated in a publicly-funded school based program. These findings would be difficult
to generalize to parents outside of Canada.

Zimet and Rosenthal (2010) examined 18 studies to analyze parental support of
vaccinating their children for HPV. Studies varied by sample size and methodology.
Smaller sample sizes were obtained from individual interviews and focus groups, while
questionnaires and phone surveys yielded larger sample sizes. Eight studies were done in
US, focusing on populations in a specific state, four of which were based out of Indiana.
Two studies were conducted in Massachusetts, one in New York, and one in Texas.
Other studies were performed in Canada, United Kingdom, Australia, Finland, Turkey,
and El Salvador. All of the studies concluded that around 60-65% or more parents would
vaccinate their sons and there was no statistically significant difference in vaccinating
daughters over sons (Zimet & Rosenthal, 2010). Resistance to vaccination was most
noted in parents who believed their sons had a low risk of infection (Zimet & Rosenthal,
2010). Noted strengths from the review are the inclusion of international and minority
data and several different study methodologies. Weaknesses of the review are that no
studies were only about male children and a few studies asked about STI vaccination in
general and not specifically about HPV.
Cates, et al. (2012) used a qualitative research design based on focus groups and intercept interviews of parents in North Carolina to determine what would motivate parents to vaccinate their sons against HPV. Five focus groups with a total of 29 black parents were used to identify common themes surrounding HPV (i.e. low awareness of the disease and vaccine, benefits and barriers of vaccination) and which messages would increase acceptability of the vaccine (i.e. protecting their child, showing diversity in images promoting vaccination, and providing information at doctor’s offices and churches) (Cates et al., 2012). Intercept interviews were conducted of 100 parents of boys aged 9-13 from a health clinic seeing primarily adolescents and included a diverse population. Conclusions drawn from the interviews are that the most motivational message is “one in two people get HPV”, most parents (47%) would talk to their son’s provider, and 48% would need vaccine safety information before making a decision about getting the son vaccinated (Cates et al., 2012). This study uses qualitative data from both mothers and fathers of adolescent boys that will be useful for providers in knowing how to motivate and counsel these parents. The study is limited by using a convenience sample and relatively small sample size.

Healthcare Provider Attitudes Regarding Vaccination

Several studies cite recommendations from healthcare providers as a factor that would increase vaccine acceptability. It is therefore significant to examine healthcare provider attitudes about offering or recommending HPV vaccination to their male clients.

Mays and Zimet (2004) provide a descriptive analysis of nurse practitioner (N=224) attitudes about recommending STI vaccination to parents of adolescents. Data was gathered at professional conferences in 2 Midwestern states via anonymous written
questionnaires that used hypothetical scenarios varying by infection type, patient age, gender, and endorsement to assess vaccine acceptability (Mays & Zimet, 2004). Although most of the 224 nurse practitioners were found to be willing to recommend STI vaccination (mean = 72.0, SD=19.8), factors that increased the likelihood of recommendation was older age of the adolescent (mean =52.3, SD=27.3) and endorsement of the vaccine by a health professional organization (mean=88.8, SD=20.1) (Mays & Zimet, 2004). A strength of this study was its high participation rate. Limitations of the study were the majority of subjects were female and generalization of recommendations for several STI vaccinations, not specifically HPV.

Jensen, et al. (2009) expanded their study to include physicians, physician assistants and nurse practitioners specializing in family medicine, pediatrics, and gynecology (N=204) in evaluating attitudes toward HPV vaccination. A total of 518 anonymous surveys were mailed to providers. Jensen, et al. (2009) found that 95% of providers surveyed planned to recommend the HPV vaccine to adolescent patients; however, 67% of these providers only intended to recommend it to their female patients. Most providers (75%) cite lack of vaccine endorsement by their health professional organization as the main reason for the discrepancy between male and female patients (Jensen et al., 2009). The study is strengthened by its inclusion of multiple disciplines and maintaining anonymity of participants which increases the likelihood of truthful responses. The study is weakened by a low response rate and drawing participants from only Dane County, WI.

A qualitative analysis of 31 healthcare providers in Boston, MA used interviews to understand providers’ attitudes of HPV vaccination in young men (Perkins & Clark,
Study participants included family medicine and pediatric physicians and nurse practitioners who see primarily low-income clients. One-on-one interviews assessed the provider’s feelings of vaccinating young males and their reasoning. Results indicate that 77% of providers supported vaccinating males; however, only 12% vaccinate males in their practice (Perkins & Clark, 2012). Only 2 of the 31 providers interviewed fully understood the health risk of HPV to males (Perkins & Clark, 2012). Some believed the vaccination effort was just not worth the cost (Perkins & Clark, 2012). Although the study was limited by a small sample size and participants cared for a specific population, the qualitative nature helps to explain why providers might not be as willing to target vaccination to both genders.

**Vaccine Safety and Efficacy**

Vaccine safety and efficacy was noted to positively correlate with male patients’ willingness to receive the HPV vaccine (Reiter et al., 2010). Vaccine safety and efficacy information would be beneficial to parents when making decisions about the vaccine and to providers when educating patients and families. Gardasil is contraindicated in individuals with a hypersensitivity to yeast, an ingredient in the vaccine, or previous allergic reaction to the vaccine (Merck & Co., Inc., 2011).

Pomfret, Gagnon, & Gilchrist (2011) performed a literature review to examine the safety of Gardasil. Safety information was gathered from the Vaccine Adverse Event Reporting System (VAERS), the Vaccine Safety Datalink (VSD) Project, and the Clinical Immunization Safety Assessment (CISA) (Pomfret et al, 2011). As of 2008, VAERS reported 11,916 adverse events out of 23 million doses of Gardasil administered (Pomfret et al., 2011). Non-serious events such as fainting, injection site pain/swelling, headache,
nausea and fever comprised 94% of adverse events, while the remaining 6% were deemed serious events including Guillain-Barre Syndrome, blood clots, and death (Pomfret et al., 2011). Each organization (VAERS, VSD, and CISA) had healthcare professionals evaluate these serious adverse events and were unable to find a link to implicate the vaccine as the cause (Pomfret et al., 2011). Information was also gathered from manufacturer studies of safety in males through 2008 and found mild to moderate injection site reactions (i.e. pain, swelling, erythema), but no serious adverse events (Pomfret et al., 2011). This literature review is strengthened by including all safety information monitored by the CDC and FDA, but limited in that safety information precedes recommendation for vaccination in males.

One quantitative analysis used an ecological study design to assess the effectiveness of HPV vaccine in reducing genital warts (Bauer, Wright, & Chow, 2012). Genital wart trends in California were taken from ICD-9 diagnosis code data submitted via a program serving low-income patients. Over 8 million male and female patients were served over 4 years and a total of 83,052 were diagnosed with genital warts (Bauer et al., 2012). While no data on actual vaccination status was obtained, the incidence of genital warts decreased between 2007 and 2010 for both males and females under the age of 25 (Bauer et al., 2012). Males specifically saw a decrease of 18.6% (95% CI:-24.8%, -12.5%; p<0.001) in clients under 21 years of age, while female rates declined by 34.8% (95% CI:-38.2%,-31.5%; p<0.001) (Bauer et al., 2012). The benefit of using a large sample size adds to the notion that the HPV vaccine is effective at the population level; however, in the absence of vaccination status data, it is difficult to conclude that results are caused by increased vaccination rates and not by other factors.
Giuliano, et al. (2011) conducted a randomized, placebo-controlled, double-blind study (N=4065) to assess Gardasil efficacy in males, which concluded that the vaccine was 90.4% effective against HPV-related external genital lesions. Interestingly, the vaccine was more effective at 92.4% in heterosexual males (n=3463) than in males who have sex with males (n=602) at 79% (Giuliano et al., 2011). This study used a large sample size and incorporated 18 different countries which augment its validity. A potential drawback is sponsorship by the vaccine manufacturer; however, the trial claims strict adherence to institutional review board protocol (Giuliano et al., 2011).

Cost-effectiveness

Based on the knowledge that healthcare providers’ attitudes are influenced by professional organization endorsement of HPV vaccination, it is worthwhile to examine factors that affect endorsement. Perhaps of greatest significance is the issue of cost-effectiveness to include males in a routine immunization program. According to the CDC (2012), the latest price for Gardasil in July 2012 is approximately $130 per dose or $390 for the full 3-dose series.

A quantitative study to predict cost-effectiveness of including boys in the HPV vaccination program in the US was presented by Kim and Goldie (2009). Different vaccination scenarios were compared including vaccinating 12-year old girls only at 75% and 50% coverage, then adding 12-year old boys to routine vaccination at 75% and 50% coverage rates. Model variables differed by evaluating the impact of vaccination on cervical cancer alone, HPV-related cancers occurring in males and females, and other HPV-related disease (i.e. genital warts and juvenile onset recurrent respiratory papillomatosis). The analysis also compared cost effectiveness based on different vaccine
efficacy rates and included changing cervical screening approaches. Cost-effectiveness outcomes were measured in terms of cost per quality adjusted life year (QALY) gained and revealed, in most scenarios, vaccination to both sexes exceeded $100,000 per QALY, while vaccinating females alone was generally below $50,000 per QALY gained (Kim & Goldie, 2009). Although benefits of including boys was recognized, it was ultimately found that it is not as cost-effective to include boys, as it is to increase vaccination in females (Kim & Goldie, 2009). This study is strengthened by its use of a model that includes costs of multiple HPV-related illnesses, but is limited by excluding males who have sex with males who are at a higher risk of developing anal cancer.

Chesson, et al. (2011) also conducted a quantitative study to address the question of cost-effectiveness of adding males to a routine vaccination program. Health outcomes included cervical and other HPV-related cancers, genital warts and recurrent respiratory papillomatosis as in the previous study. Average cost per person for vaccination was estimated at $500 including vaccine and administrative costs. Cost-effectiveness was compared at 20%, 30% and 75% coverage scenarios for females only and both female and male vaccination. While cost-effectiveness of including males in a vaccination program is decreased (> $100,000 per QALY gained) as female vaccine coverage reaches 75%, the cost per QALY gained is found to be below $50,000 with lower female vaccination coverage around 20-30% (Chesson et al, 2011). Lower coverage scenarios were compared based on recent estimates of 30% coverage for 12-year old girls in the US with the presumption that it will take years for vaccine coverage rates to increase substantially due to vaccine barriers (Chesson et al, 2011). Benefits of the study include the use of more recent information and statistics regarding HPV vaccine efficacy,
coverage, and health outcomes. Noted limitations are the use of a simpler, modified model that does not specifically measure males who have sex with males and may exclude other potential vaccine costs and benefits that have not yet been sufficiently researched.

Discussion

The literature review outlines the risks associated with HPV for males and the value of Gardasil with a 90% efficacy preventing genital warts in this population. As shown in these studies, many men are ill-informed about HPV, its incidence, and the consequences of HPV-related illness. Parents' intentions to vaccinate their sons vary with awareness and personal beliefs. Patients and their families have been shown to be more willing to accept the vaccine if it is shown to be safe and effective combined with a better understanding of health concerns associated with HPV in males. Patients and parents would also be more willing if their healthcare provider recommended the treatment. Many providers prefer to wait for professional organization endorsement before making recommendations to vaccinate male patients. In addition, some providers are still unaware of the serious risk HPV poses to males. It has been predicted that routine immunization of males is not as cost effective as increasing immunization rates for females; however, cost effectiveness increases with lower female immunization rates as it will take time to expand coverage to all females. Identifying these factors is the first step in overcoming barriers to vaccination.

Significance to Nursing Practice

It is apparent from the literature review that many patients and families have a lack of knowledge and/or understanding of HPV in males and Gardasil. It is also noted
that male patients and parents of adolescent boys respect healthcare providers’ opinions and would be more accepting of the vaccine based on provider recommendations. Nurse practitioners are patient advocates. It is our duty to educate patients to the best of our ability and provide quality care. Every male has the right to be educated about HPV and its risks. Nurse practitioners must provide patients and families with accurate, detailed information to reverse misconceptions about HPV. Messages conveying the high incidence of HPV among all populations and parents’ ability to protect their child from HPV-related health risks may help persuade parents to get their sons immunized. It will also be important to discuss safety and efficacy. A noted barrier to vaccination is parents’ beliefs that the vaccine will promote risky sexual behavior. Educating parents that the vaccine is most effective before first sexual contact could help end this debate.

Because HPV vaccination in males is relatively new, it is vital that nurse practitioners frequently review current literature and stay up to date with standards of care so accurate information is relayed to patients.

The CDC and ACIP are now recommending routine vaccination for males and have incorporated these recommendations into their printed immunization schedules for both parents and providers (Dunne et al., 2011). As of 2012, the American Academy of Pediatrics (AAP) and American Academy of Family Physicians (AAFP) are aligning themselves with the CDC and ACIP and have updated policy statements recommending the HPV vaccine to males (Committee of Infectious Diseases, 2012). To date, no nurse practitioner organization has made a policy statement regarding this topic. Nurse practitioners should appeal to their professional organizations to weigh in. Now that the FDA has approved Gardasil for use in males to prevent both genital warts and anal cancer
due to HPV, all males should be afforded the opportunity of receiving the vaccine, if they so desire.

Summary

Because cost-effectiveness may play the biggest role in prompting professional organizations to recommend HPV vaccination in males and because healthcare provider attitudes are greatly influenced by these endorsements, it is essential to conduct further research to measure cost-effectiveness in terms of monetary cost of vaccination compared to cost of potential HPV-related illness. Both studies analyzing cost-effectiveness left out males who have sex with males and made assumptions regarding vaccination coverage rates in females and long-term efficacy of vaccination. Males who have sex with males have been shown to desire the vaccine and would receive great benefit from it as they are at higher risk for developing anal cancer, which Gardasil may prevent. Also, the studies do not reflect some of the most current research, including the increasing incidence of HPV-related morbidity in males. It is important to incorporate gay or bisexual men and new evidence in data collection, when analyzing a cost benefit ratio. Males have an opportunity to prevent the spread of a common STI and reduce future HPV morbidity and mortality by simply receiving an immunization. In a country that has the resources to make the vaccine widely available, every measure should be taken to improve public health.
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