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Introduction

The amount of attention dedicated to the human papillomavirus (HPV) in both the media and the medical community over the past six years has been ever increasing. The development and implementation of the HPV vaccine has brought to the surface any number of ramifications. As a vaccine against cancer, the implications and importance of this scientific achievement cannot be downplayed. HPV is the most common sexually transmitted infection (STI) and in most HPV types, does not cause any noticeable symptoms. However, in about ten percent of cases, HPV can cause genital warts, cervical cancer, anal cancer, penile cancer, or various head and neck cancers ("Genital...", 1).

With the first vaccine's approval in 2006, it was recommended for administration in girls between the ages of 11 and 12, with the main focus being on the prevention of cervical cancer (Markowitz et al. 16). Researchers recommended the early age of vaccination because of its increased effectiveness and necessity for vaccination before the first sexual encounter. Critics of vaccination immediately responded with critiques about lack of efficacy and safety data, similar to the anti-vaccination minority seen with other vaccines. However, the most striking argument was that vaccinating young girls against the vaccine would lead to increased promiscuity (Casper & Carpenter, 886). The recent recommendations by the Advisory Committee on Immunization

Practices (ACIP) and the American Academy of Pediatrics (AAP) in the past months have expanded to include all children (boys and girls) between the ages of 11 and 12, up to age 26 for certain demographics of males ("Recommendations," 1705; "HPV Recommendations," 604). Despite these recommendations, only about one-third of girls and one percent of boys have been vaccinated (Knox, 1).

To effectively implement the HPV vaccine, it is important to consider what factors or barriers may be unique to this vaccine. First, HPV-related diseases disproportionately affect ethnic and sexual minorities. Race and socioeconomic status have all been linked to higher rates of cervical cancer in these females (Hughes et al, 366). Men who have sex with men (MSM) and HIV-positive men are much more likely to develop HPV-related anal cancer than other men ("HPV and Men," 2). It is important to consider vaccine access and acceptance within these populations to determine the uptake and effectiveness of the vaccine.

Secondly, since the vaccination is recommended for implementation during adolescence, parents and physicians play a large role in seeking and providing the vaccine for their children. Many parents seek answers to questions on the internet, instead of from providers, making them more vulnerable for misinformation. Demographic factors also influence which parents are more likely to have their children vaccinated (Downs et al., 1595). Support for mandated vaccinations is low because it decreases parental autonomy (Ferris et al., 220). Patients who receive a strong physician recommendation are more likely to receive the vaccination (Rosenthal, et al., 893; Vadaparampil et al., 8640). Physicians, who influence the delivery of the vaccine to the majority of targeted patients, deserve special attention.

Finally, the sexual nature of the disease brings with it a number of factors to influence care. Stigma associated with STIs has been shown to influence patients seeking treatment and care (Lichtenstein, 2435). It has also been shown that increased knowledge about the disease transmission may negatively influence the patient experience (Waller, 157). Some 13% of girls in the US are sexually active by age fifteen (Charo, 1907), which brings to light the need of increased awareness and education among children and parents.

Demographic Factors

Cervical cancer is the second most common cancer in women, with 493,000 new cases annually worldwide, but with only about 12,000 cases occurring in the United States. With some 225,000 deaths from cervical cancer, about 80% of all deaths are in developing countries ("Genital," 2; Casper & Carpenter, 888). African American women are 50% more likely to be diagnosed with cervical cancer, and twice as likely to die from cervical cancer as white women. Also, women who live in rural areas have higher cervical cancer death rates than those women in urban areas (Cates et al., 93). Pap tests are the best way to screen for cervical cancer in women. With early detection and appropriate treatment, cervical cancer mortality can be greatly reduced. The Pap test allows providers to remove abnormal cells before they advance to further stages of cervical cancer ("Genital," 4).

Among cases of cervical cancers in the US, most deadly cases can be found based on ethnicity or socioeconomic status (Casper & Carpenter, 888). It is thus important to consider what factors influence patients seeking preventative care. In a sample of minority women living in public housing, approximately 33% had not received a cervical cancer screening in at least

two years. Some factors associated with this lack of seeking care were both education level and fluency in English. Women who had some type of healthcare coverage were two times more likely to have had a screening, likely because of their easier access to a physician (Bazargan et al., 469-72). The lack of access to pap testing in these minority populations highlights that this population needs to be specifically targeted for administration of the HPV vaccine as an alternative prevention strategy. However, the barriers that existed for pap screening will likely be similar for access to the HPV vaccine, thus only furthering the disparity (Brewer & Fazekas, 113).

Knowledge and understanding of HPV and health information is an important factor in determining whether patients seek the vaccine and is a factor in health disparities (Hughes et. al, 264). There are many disparities in both knowledge and acceptance of HPV and the vaccine in southern women. More than 25% fewer black women had heard of HPV and also scored lower in HPV knowledge than white women. Although knowledge of the vaccine was very low in both ethnic rural populations, black women were more likely to not want to vaccinate their daughters before the age of 17 for HPV (Cates et al., 94-6). In a similar study of caregivers for young females, much the same was found in terms of health knowledge disparities. While 82% of all caregivers had heard of the HPV vaccine, African American and other non-white races, less educated, and those of a lower socioeconomic status were much more likely to be unaware of HPV. Only about two-thirds of questions about HPV were answered correctly on average (Hughes et al., 366-70). It is important to tailor vaccine education to both rural and ethnic populations to ensure HPV vaccine uptake in these vulnerable populations.

Specifically in the African American community, there is a difficult dynamic that exists between medical professionals and patients. Particularly, many in the South use the example of the Tuskegee experiment, which denied treatment for STI-infected males, as a motivation for their avoidance of care. African Americans are also distrustful of the medical statistics that point to the idea that they have the highest rates of STI infection (Lichtenstein, 2440). The belief that they as African Americans are targets of the medical establishment only serves to prevent vaccination and testing, furthering the infection rate of this population.

Anal HPV infection is very common in the MSM community, in that 60% of all individuals are infected, and 90% of all HIV-positive individuals are infected (Reiter et al., 197). Since vaccination of male adolescents has only recently been suggested by the ACIP and AAP, very little data is available about actual uptake of the vaccine among males. However, since MSM and HIV-infected persons are at a greater risk for being affected by HPV-related diseases, acceptability and knowledge in this population has been studied. Anal cancer in both men and women can be screened for, using a pap test, similar to those used for cervical cancer screening in women ("HPV and Men," 2-3). However, many barriers exist that prevent men at high risk from seeking screening and treatment. Mainly, "anal cancer screening alone identifies men as first, engaging in receptive anal intercourse, and second, as being gay" (Newman et al., 332). Men can be hesitant for fear of reactions from health care providers and the possibility of negative reactions. Men, particularly in the Latino community, are reluctant to seek any type of preventative healthcare, and only seek treatment once symptoms have manifested (Newman et al., 334).

Current knowledge of the vaccine and virus risks are important to consider in determining uptake of the vaccine. In a 2011 study, although most men had heard about HPV, only about 25% knew that the vaccine was also available for males. Also, many men were unaware about the health implications for men, including genital warts and anal, oral, or penile cancer (Wheldon, 8063; Reiter et al, 198). Since most MSM are not open about their sexual interests before their first sexual encounter, the strategy to target all males for vaccination is extremely important (Reiter et al, 201).

Parents, Providers, and Vaccines

Since the target demographics for vaccination are young adolescents, in the absence of a mandated vaccination, parental knowledge and acceptance of the vaccine will be critical for successful implementation (Zimet, S19). Studies considering vaccine acceptability among parents have spread light on different factors that parents consider important. There are a number of reasons why parents may choose not to vaccinate children against a disease. The lack of vaccinations can be related to socioeconomic factors or objections for religious or moral issues (Downs et al.,1595-6). Daughters who are vaccinated tend to be older, and have parents who have positive attitudes toward vaccination and more HPV specific knowledge (Gerend et al., 530). Since most parents are unaware of the prevalence of HPV, acceptance of the vaccine is much lower than ideal levels for increased community protection (Ferris et al., 227).

By far, one of the most significant factors important to the response of parents to the HPV vaccine concerns the location of information received. Many parents have received basic knowledge and awareness of the HPV vaccine as a result of pharmaceutical advertisements

(Hughes et. al, 367). This is favorable in the sense that the information being received about the vaccine is likely positive. On the other hand, parents also receive their information from online sources. The increase in access to medical information by some has allowed many to question medical knowledge openly (Leask et al., 7238). Some parents have a lack of basic understanding of the mechanisms of vaccines (Downs et al., 1604). Although CDC fact sheets do exist, many parents seek more information online instead of consulting their physicians. As a result, parents are more vulnerable to misinformation and may be unaware when this information is presented. Parents researching about vaccination within simple web searches are likely to encounter anti-vaccination websites (Zimet, S21). These groups focus less on generic factual information, and more on broad arguments resulting in an emotional response (Leask et al., 7238). This can include information about medical controversies or capitalistic motivations, and foster negative attitudes of those already suspicious of the government and the medical establishment.

Physicians play extremely important roles in ensuring the behavior and activities of their patients. Acceptance of vaccines in general is linked to a physician's recommendation. A physician recommendation has been shown to be the strongest predictor of vaccination among older adolescents (Rosenthal et al., 893). Adolescent health care providers include family practitioners, pediatricians, and obstetricians/gynecologists (OB/GYNs). Pediatricians are much more likely to recommend vaccination. Among all these specialties, physicians recommended the vaccine to early adolescents much less than to older adolescents, even though vaccination recommendations specify early adolescents as targets. Of most interest is that those physicians who participated in the Vaccines for Children (VFC) program, providing the vaccine at no cost to

Medicaid patients, were much more likely to recommend the vaccine, likely because of better funding and availability of the vaccine (Vadaparampil et al., 8636-38).

Despite the importance of physicians educating parents, this may not have as strong a function as expected. Even with the receipt of information about HPV and the HPV vaccine, the likelihood of parents to vaccinate children did not change before and after information receipt. This is significant because parental negative attitudes toward vaccination may be based on feelings and personal views, rather than factual information (Dempsey et al., 1491).

Disease and Sexual Stigma

The HPV vaccine represents an effective prevention strategy for a contagious, sexually transmitted disease. By eliminating the "contagion," the vaccine removes the danger, risk, and vulnerability of those at risk. At the same time, the vaccine introduces itself into a very private and personal area of life which is not often discussed. The implementation of the vaccine has served to "transform social relations," forcing the discussion of medical advancement to occur within the context of social change and expectations (Casper & Carpenter, 887).

The United States has some of the highest rates of STIs among all other developed nations (Lichtenstein, 2453). One of the most important factors associated with this is the stigma that is attached to sexual behavior and its consequences. Stigma is "an attribute or label that sets a person apart from others and links the labeled person to undesirable characteristics" (Fortenberry qtd Lichtenstein, 2437). Stigma serves as a significant deterrent in terms of patients seeking treatment. The study by Waller et al., sought to study the effect of STI knowledge on the patient experience. Patients who were HPV infected and knew HPV was an

STI had higher levels of stigma and shame. However, those who were also told about the high prevalence of HPV were shown to have lower levels of stigma and shame (157-8). Without active HPV education, the knowledge of HPV as an STI may serve as a barrier for vaccination because this would serve as an acknowledgment of sexual activity.

The sexual nature of the vaccine also creates different reactions based on gender. Although many were worried about the idea of immunizing young girls for an STI, the reaction has not been the same for immunization of boys (Knox, 1-2). In either gender, the feeling is that by administering an STI vaccine to young adolescents, they may be more likely to engage in sexual activity because of the decreased perceived risk and fear. Of those parents who did not want to vaccinate a female child, the main concern was sexual activity increasing (Herzog et al., S6). The gender difference is also seen with access to treatment for other STIs. Although women were judged and blamed when they sought treatment, male sexual behavior was viewed as expected and normal. The effect of gender and sexual activity affects the willingness of patients to seek vaccination and information (Lichtenstein, 2438-9).

Recommendations and Conclusions

The HPV vaccine is still a relatively new treatment that health care providers are trying to successfully implement. The sexual and ethnic minorities disproportionately affected by the infection are equally affected by lack of knowledge about HPV (Hughes et al., 363-4). Focusing only on educating parents may not be enough to influence parental attitudes about vaccinations. One of the strongest factors may indeed be provider recommendation to increase vaccination. The sexual nature of HPV involves having to address differences in expectations of boys and

girls, and appropriate behavior by age. Much still needs to be studied to determine how to continue to increase awareness and uptake of the vaccine. With the still recent recommendation of vaccination of boys, public reactions and opinions are still unknown and will likely change.

To combat the influence of anti-vaccination messages, it will be useful for parents to be informed by their physicians upfront about the risks of vaccination. If properly educated about the low risks, surprising stories about the side effects of vaccination will have less of an effect (Leask et al., 7248). Also, framing the vaccine as disease prevention against genital warts and cervical cancer may increase vaccination rates. Since genital warts are a more visible consequence of HPV, parents may be more willing to protect children against a visible indicator of an STI to protect them from the associated stigma (Dempsey et al., 1492).

To consider what might be the most effective strategy for vaccine implementation among adolescents, it is useful to consider the implementation of the Hepatitis B vaccine. While only about 33% of adolescent girls are currently vaccinated for HPV, 96% are vaccinated for Hepatitis B, even though it is usually transmitted via sexual contact as well. The importance here is that the Hepatitis B vaccine is mandated for students before entrance to middle school (Ferris et al., 220; Knox, 1). Once mandated, large scale school vaccinations programs were aimed at vaccinating those who had missed vaccination at an earlier age. By mandating the vaccine for middle school entry, social and economic disparities in terms of access to the vaccine were eliminated (Averhoff, et al., 982-3; Stewart, 801).

The legal argument against mandating the HPV vaccine is that HPV can only be transmitted via intimate contact, as opposed to casual contact via blood like hepatitis B (Stewart,

802-3). However, including an opt-out system will allow parents who have an objection to address their concerns, while allowing the children of those not against the vaccine to easily receive the vaccine as part of school vaccination programs without parental action (Charo, 1906-7).

Also, the idea that vaccination against the STI is against abstinence only teachings in schools should only be used to highlight the ineffectiveness of abstinence only approaches. Since 43% of girls are sexually experienced by age 17, school based STI preventative treatments need to be seriously considered. Also, the idea that vaccination alone encourages sexual activity completely ignores all other threats such as pregnancy and HIV/AIDS (Charo, 1907). Teenage sexual activity is a fact in the United States and cannot be ignored.

The argument has been made that HPV is being misrepresented by the media and pharmaceutical companies as an immediate threat and epidemic in the west, while an epidemic does not exist (Connell & Hunt, 64). HPV is a deadly and, until recently, silent epidemic among some of the most vulnerable populations in the United States. To effectively reach these populations, all must be targeted for vaccination. To recommend the vaccine at a young age to only those at an increased risk would not work because some may not have the ability to be identified in the risk group, such as homosexual boys or sexually active boys or girls (Humisten & Rosenthal, S136). The HPV vaccine is a significant advancement in medical technology. The various factors affecting the acceptance and uptake of the vaccine are important to consider, address, and continue to study in order to completely address the barriers to vaccination.

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