The Success Story that is HPV Vaccination

Overview of HPV

Human papilloma virus (HPV) is a requisite cause for the development of cervical cancer and other malignancies, such as vulvar cancer, vaginal cancer, and certain oropharyngeal and rectal cancers.[1] Certain HPV serotypes are associated with high cancer risk, as shown in the **Table 1**. Types 16 and 18 are particular concerns because they are highly prevalent and also high risk.[1]

Table 1: HPV Serotypes Associated with High Cancer Risk

HPV High-Risk Serotypes					
31	***33***	***35***	***39***	***45***	***51***
52	***56***	***58***	***59***	***66***	***68***
		16	***18***		

Women who are persistently positive for type 16 can have up to about a 40% chance of developing a significant precancerous or cancer lesion in their lifetime.

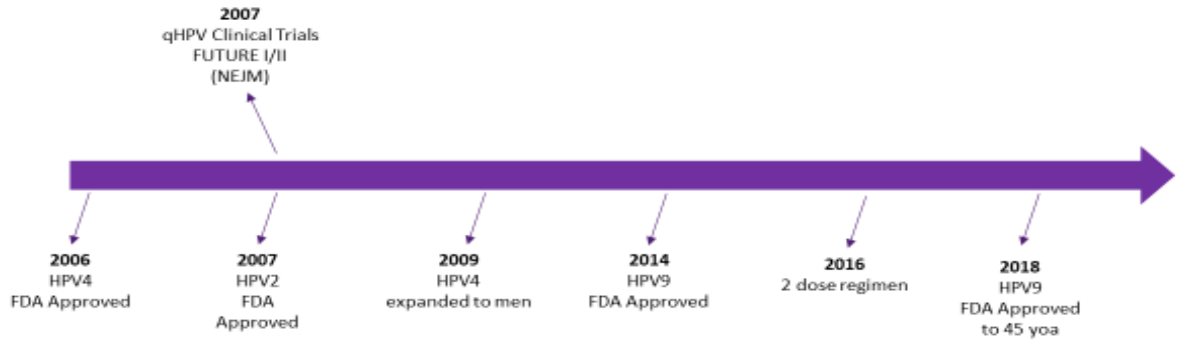
Thus, it is important to assess HPV serotype as well as HPV positivity.

--Warner Huh, MD

HPV Vaccines

Historically, the original quadrivalent HPV vaccine, known as Gardasil®, was introduced in 2006. A bivalent vaccine known as Cervarix® was introduced in 2007. A nonavalent vaccine known as Gardasil®9 (HPV9 vaccine) was introduced in 2014 and is currently the only commercially available HPV vaccine (**Figure 1**).

Figure 1: HPV Vaccine Development Timeline



Recommendations for the use of the vaccine have evolved substantially since 2014. Currently, vaccination is recommended for boys as well as girls. [1] In 2019, the HPV9 vaccine received FDA approval for women up to 45 years of age and was recommended by the CDC and Advisory Committee on Immunization practices (ACIP) for "catch-up" vaccination in women up to 26 years of age and shared decision-making for women up to 45 years of age who are not adequately vaccinated.[1-3] This represents a unique opportunity to offer vaccination, particularly to women between 26 and 45 years of age.

Of the 9 HPV types covered by the HPV9 vaccine, 7 are considered to be high risk. Immunization should dramatically reduce the risk of HPV infection with these strains and cause a corresponding reduction in the risk of the associated cervical cancers. Immunization with HPV9 also prevents most oropharyngeal and head and neck malignancies. Although the HPV9 vaccine is primarily intended for the prevention of cervical cancer, its importance for preventing these cancers should not be underestimated.

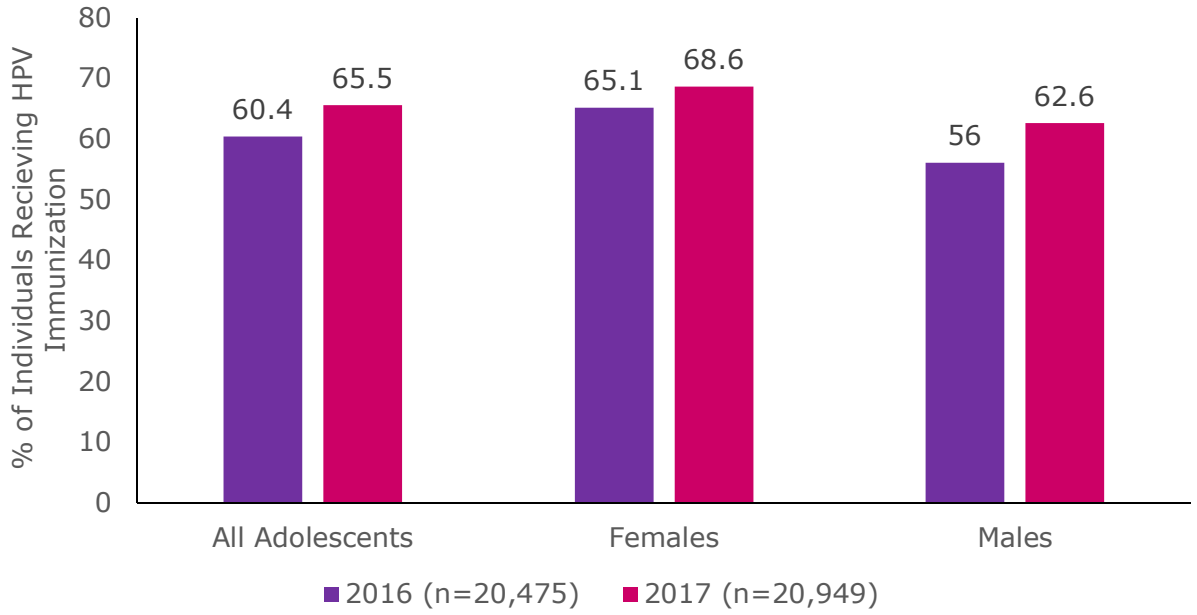
Roughly 92% to maybe 93% of all invasive cervical cancers could theoretically be prevented [by immunizing women with the HPV9 vaccine]. Moreover, the majority of oropharyngeal and head and neck malignancies are caused by HPV type 16, which is covered by the HPV9 vaccine.

--Warner Huh, MD

HPC Vaccination Rates

Survey data from the CDC shows that HPV vaccination rates have improved, with about 60% to 65% of teens immunized in 2017 (see **Figure 2**). Vaccination is usually driven by a recommendation from the patient's health care provider, and the provider's recommendation has a considerable positive influence on whether a teen actually receives an HPV vaccination.

Figure 2: HPV Vaccination Rates in 2016 Among Adolescents in the US



HPV Vaccine Efficacy, Safety, and Duration

There is clear data showing the impressive efficacy of HPV vaccination at a population level. The best demonstration is Australia, which was one of the first countries with a significant HPV vaccination campaign. Studies on the effects of HPV in Australia found a 93% reduction in the incidence of genital warts over 4 years among girls who had been vaccinated, protection rates as high as 80% among boys, and a decrease in the rate of abnormal Pap smears.[4] The high vaccination rates and decreasing disease rates are so impressive that Australian experts expect to largely eradicate cervical cancer in Australia within 20 years.[5]

One Australian study saw about a 93% reduction in the incidence of genital warts in girls that had been vaccinated over a 4-year period of time.

--Warner Huh, MD

Several studies have looked into the duration of protection from HPV vaccines. One key study was published by Kjaer and colleagues in 2018. It used data from the Nordic Registry on women who were vaccinated and followed over approximately 12 years. In this nearly 10,000 patient-years of follow-up, there were no cases of breakthrough disease, particularly for HPV types 16 and 18. Thus, the study found that the HPV vaccine provides protection for at least a decade with a trend toward 12 years.[6] However, it remains unclear if a booster will be needed at some later point in time.

Probably the single-most important finding was that they did not see any cases of breakthrough disease, particularly related to HPV type 16 and 18.

--Warner Huh, MD

The HPV vaccine may be the vaccine most heavily scrutinized for safety by the scientific community and the lay community as well. There have been 10 years of follow-up and at least 6 studies investigating the safety of the HPV vaccine.

There have been multiple studies of the toxicities that are related to the HPV vaccine, and when you look at many of these studies, the safety of the HPV vaccine is actually quite impressive.

--Warner Huh, MD

Since 2016, a 2-dose immunization schedule has been recommended for individuals initiating vaccination before their 15th birthday, with a 3-dose schedule vaccinations starting at older ages.[7] An exploratory study conducted in Costa Rica has shown an impressive level of protection with a single-dose immunization.[8] A definitive study sponsored by the National Cancer Institute is underway and should provide clear guidance in the early 2020s. [9]

I think that [a single-dose option] will totally be a game-changer for how we offer HPV vaccination, not only in this country but worldwide.

--Warner Huh, MD

Conclusions

Overall, the HPV9 vaccine provides effective protection against HPV infection. The vaccine covers 9 HPV strains, including 7 strains associated with a high risk of cervical cancer and other malignancies, such as oropharyngeal and head and neck cancers. By protecting against infection by these strains, it prevents most of related cancers. Because the protection goes beyond cervical cancer, both boys and girls should be immunized. In fact, the HPV9 vaccine has received FDA approval for both girls and boys and, in addition, is recommended for catch-up immunization for women up to 45 years of age. As there is considerable misinformation about HPV immunization, it is critical for physicians to support and educate parents, caregivers, and children on the importance of the HPV vaccine related to the reduction of many lethal cancers.

References

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