HPV Vaccine Prevents Cancer in Both Women and Men

Vaccination was linked to lower rates of cervical cancer among young women and mouth and throat cancer among young men.

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Human papillomavirus (HPV) vaccination reduced the risk of cancer for men as well as women, according to study findings presented this week at the American Society of Clinical Oncology Annual Meeting (ASCO 2024) in Chicago. Another recent study offers further real-world evidence that the vaccine has dramatically lowered cervical cancer incidence in the United Kingdom. But only a minority of adolescents and young adults in the United States have received the vaccine.

“This study adds to a growing body of evidence demonstrating decreased rates of HPV-related cancer among people who received the HPV vaccination,” Jefferson DeKloe, a research fellow at Thomas Jefferson University, said in an ASCO news release.

Most people acquire at least one of the more than 100 known types of HPV soon after they become sexually active. The virus triggers abnormal cell growth that can lead to genital and anal warts, precancerous cell changes (dysplasia and intraepithelial neoplasia) and, if left untreated, cervical cancer, anal cancer, mouth and throat (oropharyngeal) cancer and genital malignancies.

Regular cervical or anal screening can detect abnormal cell changes before they progress to invasive cancer, but vaccines can prevent HPV infection in the first place. The Gardasil 9 vaccine, approved in 2014, protects against the two main cancer-causing HPV types (16 and 18), five other high-risk types and two types (6 and 11) that cause genital and anal warts. The original quadrivalent Gardasil vaccine, which targets four HPV types, was approved in 2006; the Cervarix vaccine, approved in 2009, targets only two types.

Earlier research showed that vaccines prevent HPV infection and precancerous cell changes. But because the vaccines were first introduced about two decades ago, it has only recently become possible to see their effectiveness against cancer itself, which typically takes a long time to develop. The evidence to date is strongest for cervical cancer. There is limited evidence for other HPV-related cancers, especially among men, as routine vaccination started later for boys.

DeKloe and colleagues conducted an observational study of HPV-related cancer rates among more than 3.4 million people ages 9 to 39 years in the TriNetX United States Collaborative Network.

Within this group, 945,999 women and 760,540 men were vaccinated for HPV between 2010 to 2023, and an equal number remained unvaccinated. About half were white, around 20% were Black, 5% were Asian and around 20% were of another or unknown race.

HPV vaccination was associated with decreased rates of HPV-related cancers, including cervical cancer in women and head and neck cancer (a broad category that includes mouth and throat cancer) in men. As smoking has decreased, HPV is now a major driver of head and neck cancers, ASCO president Lynn Schuchter, MD, of the University of Pennsylvania Perelman School of Medicine, noted at a preconference media briefing.

Vaccinated women were 27% less likely to develop any HPV-related cancer and significantly less likely to develop cervical cancer, specifically, compared with unvaccinated females. The risk of developing head and neck cancer was also lower, but the difference did not reach statistical significance. What's more, vaccinated women were less likely to develop advanced precancerous cervical lesions and undergo invasive procedures to treat them.

Vaccinated men saw an even greater risk reduction. They were 54% less likely than unvaccinated males to develop any HPV-related cancer (3.4 versus 7.5 cases per 100,000 people). For head and neck cancer, specifically, there was a 56% risk reduction (2.8 versus 6.3 cases per 100,000 people). There were not enough cases of anal cancer or penile cancer to do a meaningful comparison.

"We have known the HPV vaccine decreases rates of oral HPV infection, but this study shows that in boys and men, in particular, vaccination decreases the risk of HPV-related oropharyngeal head and neck cancers. HPV vaccination is cancer prevention," said Glenn Hanna, MD, of Dana-Farber Cancer Institute.

The researchers now plan to look at outcomes among vaccinated people older than 39, now that HPV vaccines have been available for almost two decades. The benefits are expected to increase as vaccinated people reach older ages, when cancer is most likely to occur.

Cervical Cancer in England

Updated study results from the United Kingdom continue to show that HPV vaccination dramatically lowers the risk of cervical cancer, and this extends to women in all socioeconomic groups, thereby reducing the disparity between more and less deprived communities.

"Our research highlights the power of HPV vaccination to benefit people across all social groups," senior study author Peter Sasieni, PhD, of Queen Mary University of London, said in Cancer Research UK news release. "In the U.K., the elimination of cervical cancer as a public health problem in our lifetime is possible with continued action to improve access to vaccination and screening for all."

HPV vaccination has been offered to adolescent girls at ages 12 or 13 in England since 2008, with catch-up vaccines for older teens. Initially, the bivalent Cervarix vaccine was used before switching

to Gardasil vaccines that target more HPV types. The program was expanded to include boys in 2019.

Sasieni and colleagues analyzed registry data on all cervical cancer cases among women ages 20 to 64 in England. They initially included cases diagnosed between January 2006 and June 2019. The new analysis extends the follow-up period through June 2020 and looks at outcomes according to socioeconomic status. Cervical cancer is much more common among women experiencing socioeconomic deprivation.

“Historically, cervical cancer has had greater health inequalities than almost any other cancer, and there was concern that HPV vaccination may not reach those at greatest risk,” Sasieni said. “Instead, this study captures the huge success of the school-based vaccination program in helping to close these gaps and reach people from even the most deprived communities.”

In 2021, the researchers reported that HPV vaccination along with regular screening sharply reduced the risk of cervical cancer and advanced intraepithelial neoplasia among women who were vaccinated as adolescents. Vaccination rates were high, reaching 85% for women who were eligible for vaccination at ages 12 or 13. Cervical cancer incidence fell by 34% among young women vaccinated at ages 16 to 18 (at which point many may have already acquired HPV), by 62% among those vaccinated at ages 14 to 16 and by 87% among those vaccinated at ages 12 to 13, relative to older groups that were not eligible for vaccination.

The extended analysis, published recently in the BMJ, included 29,968 women with a diagnosis of cervical cancer and 335,228 with advanced cervical intraepithelial neoplasia. The high effectiveness of HPV vaccination continued with an additional year of follow-up. In the birth cohort that was offered routine vaccination at ages 12 or 13, the incidence of cervical cancer was 84% lower and the incidence of advanced neoplasia was 94% lower compared with a cohort that was not offered the vaccine. The researchers estimated that vaccination prevented 687 cases of cervical cancer and 23,192 cases of advanced neoplasia

What’s more, although women living in the most deprived areas still had the highest rates of cervical cancer and advanced neoplasia, the vaccination program prevented more cases in these areas. An estimated 192 and 199 cases of cervical cancer were averted in the two most deprived areas, compared with 61 cases in the least deprived area. “The strong downward gradient in cervical cancer incidence from high to low deprivation in the reference unvaccinated group was no longer present among those offered the vaccine,” the study authors wrote.

This study “suggests that marginalized groups may benefit from the HPV vaccine despite poor social determinants of health or higher prevalence of risk factors such as smoking, alcohol consumption and reduced uptake of cancer screening,” Trisha Amboree, MD, MPH, of the University of Texas MD Anderson Cancer Center, patient advocate Joslyn Paguio, of the Cervical Cancer Advocacy Group, and Kalyani Sonawane, PhD, of MUSC Hollings Cancer Center, wrote in an accompanying editorial. “To successfully eliminate cervical cancers, policymakers must develop, implement or redesign programs to ensure equal access to the HPV vaccine for all individuals,

regardless of their income."

Many Remain Unprotected

Despite this good news, HPV vaccination rates in the United States remain too low.

The Centers for Disease Control and Prevention (CDC) recommends Gardasil 9 for girls and boys at ages 11 or 12, with catch-up vaccination for those up to age 26. The Food and Drug Administration has approved the vaccine for women and men up to age 45, and the CDC advises older individuals to talk with their doctor about whether they might still benefit.

Another study presented at the ASCO meeting found that vaccine uptake among U.S. adolescents and young adults rose by about 20% overall between 2011 and 2020, with all racial and ethnic groups seeing an increase. But still, only about half of girls and young women had received the vaccine, falling to 36% for boys and young men—far below rates in the United Kingdom.

"Identifying effective interventions that increase HPV vaccination rates is critical in reducing undue cancer burden in the United States," DeKloe said.

One way to encourage uptake is a simpler vaccine schedule. Currently, the CDC recommends two doses of Gardasil 9 administered at least six months apart for girls and boys up to age 15. Three doses are recommended for older teens and young adults. But a growing body of evidence shows that a single dose is highly effective. In 2022, the World Health Organization updated its HPV vaccine guidance to recommend either one or two doses for girls and young women ages 9 to 20 and two doses for those 21 and older. Fewer countries recommend HPV vaccination for boys, but, as the new data show, they can also benefit.

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