HPV Vaccine Dramatically Cuts Cervical Cancer Risk

Early vaccination reduces the risk of cervical cancer by nearly 90%, but many young people remain unprotected.

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A study from the United Kingdom provides further real-world evidence that human papillomavirus (HPV) vaccination dramatically lowers the risk of cervical cancer. As reported in The Lancet, the analysis found that vaccination at age 12 or 13 along with regular screening cut cervical cancer risk by almost 90% among women now in their 20s.

“It’s a historic moment to see the first study showing that the HPV vaccine has and will continue to protect thousands of women from developing cervical cancer,” said Michelle Mitchell, chief executive of Cancer Research UK, which funded the study.

HPV is one of the most common sexually transmitted infections, and most people acquire some of the more than 100 known types of the virus soon after they become sexually active. HPV triggers abnormal cell growth that can lead to genital and anal warts, precancerous cell changes and, if left undetected and untreated, cancer of the cervix, anus, vulva, vagina, penis and mouth and throat (oropharyngeal cancer). Approximately 14,000 new cervical cancer diagnoses and 4,000 deaths occur each year in the United States. Routine screening using Pap smears and HPV tests can detect abnormal cell changes before they progress to invasive cancer.

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 Food and Drug Administration (FDA) approved the original quadrivalent Gardasil vaccine, which targeted four HPV types (6, 11, 16 and 18), for young women in 2006 and for young men in 2009.

The vaccine is most effective if given before a person becomes sexually active. The Centers for Disease Control and Prevention (CDC) recommends Gardasil 9 for girls and boys ages 11 or 12, with catch-up vaccination for those up to age 26. The FDA has approved the vaccine for women and men up to age 45; the CDC advises that people between 27 and 45 should discuss with their doctor whether they might still benefit.

Previous research showed that HPV vaccines are effective at preventing HPV infection, genital

warts and precancerous cervical cell changes. But because the vaccines were only introduced in the past two decades, it has only recently been possible to demonstrate their effectiveness against cervical cancer itself, which can take years to develop.

A study from Sweden published last year showed that the quadrivalent vaccine reduced the risk of cervical cancer by 63% among young women overall and by 88% among those vaccinated before age 17. And a recent U.S. study found that between January 2001 and December 2017, cervical cancer incidence and mortality fell more in the 15 to 24 age cohort—those who were eligible for vaccination as adolescents—than it did in older age groups.

Peter Sasieni, PhD, of King's College London, and colleagues analyzed registry data on all cervical cancer cases diagnosed among women ages 20 to 64 in England between January 2006 and June 2019. The Cervarix vaccine has been offered to girls ages 11 to 13 in the U.K. since 2008, with a catch-up program for those ages 14 to 18. Vaccination rates were high overall: 85% of women eligible for vaccination at ages 12 to 13 were fully vaccinated, as were 73% of those eligible at ages 14 to 16 and 45% of those eligible at ages 16 to 18.

During the study period, there were 318,058 diagnoses of advanced precancerous cell changes (cervical intraepithelial neoplasia, or CIN) and 27,946 diagnoses of cervical cancer.

The researchers found that the HPV vaccine reduced cervical cancer incidence by 34% for young women who received it at ages 16 to 18, by 62% for those who were vaccinated at ages 14 to 16 and by 87% for those who were vaccinated at ages 12 to 13 compared with older age groups who were not eligible for vaccination. Advanced CIN fell by 39%, 75% and 97%, respectively.

The team estimated that the U.K. vaccination program prevented 17,235 cases of advanced CIN and 448 cases of cervical cancer over 11 years. Based on these numbers, Sasieni projected that vaccination could drive cervical cancer cases among women under 30 down to around 50 per year, compared with more that 400 per year prior to vaccination.

The smaller risk reduction for those vaccinated at older ages is attributed to lower vaccine uptake in those age cohorts and more women becoming sexually active, and therefore exposed to HPV, prior to vaccination. While the vaccine effectively prevents HPV infection, it does not clear the virus after infection occurs.

"It's been incredible to see the impact of HPV vaccination, and now we can prove it prevented hundreds of women from developing cancer in England," Sasieni said in a Cancer Research UK press release. "We've known for many years that HPV vaccination is very effective in preventing particular strains of the virus, but to see the real-life impact of the vaccine has been truly rewarding. Assuming most people continue to get the HPV vaccine and go for screening, cervical cancer will become a rare disease."

Based on these findings, Sasieni told the BBC, HPV screening protocols should be reevaluated, with continued screening every few years for age groups that were not vaccinated when they were young and screening perhaps two to three times in a lifetime for vaccinated individuals.

Many Remain Unprotected

The U.K, study adds to the evidence that HPV vaccines are highly effective against cervical cancer, and they are expected to prevent oral cancer too. But many people remain unprotected for a variety of reasons.

Despite the universal free vaccination program in the U.K., vaccine uptake has not quite reached the World Health Organization's 90% goal. In the United States, a recent CDC survey found that 75% of adolescents ages 13 to 17 had received at least one HPV vaccine dose and 59% were fully vaccinated in 2020. Vaccination rates are lower still in many low- and middle-income countries.

Barriers to HPV vaccination include availability, cost, socioeconomic and racial disparities and the belief that adolescents who are not sexually active do not need the vaccine—or that the vaccine will make teens more likely to have sex. The COVID-19 pandemic has also hampered efforts to deliver HPV vaccines and other immunizations for children and adolescents.

A recent modeling study projected that cervical cancer could be virtually eliminated in more affluent communities in the United States by 2030, but this could take an additional 14 years in communities with high poverty rates. However, lead author Jennifer Spencer, PhD, of the University of Texas at Austin, suggested that the disparity was not attributable to differences in vaccination rates—which were similar in low- and high-poverty areas—but rather to differences in screening rates, other social determinants of health and a higher prevalence in high-poverty areas of cancer-causing HPV types that aren't covered by the vaccines.

What's more, misperceptions about HPV vaccine safety also appear to be a growing problem. A recent study found that nearly a quarter of parents cited safety concerns as the main reason for not getting their adolescents vaccinated. The proportion of parents who mentioned safety concerns rose by 80% between 2015 and 2018, even though reports of adverse events actually fell over the same period. Some experts fear that the politicization of COVID-19 vaccines could spill over into further resistance to HPV vaccination.

State laws that allow adolescents to consent to HPV vaccination without parental permission could increase uptake. Reducing the number of required vaccine doses could also help. Currently, the CDC recommends two doses for people who start the series before age 15 and three doses for those who do so later. But a recent study in Kenya showed that one vaccine dose offered as much protection as multiple doses for women ages 15 to 20. A single dose of either Gardasil 9 or Cervarix reduced infection with HPV types 16 and 18 by 98%.

Click here to read the U.K. study abstract.
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