



The Facts on HPV Vaccine Safety and Effectiveness

HPV causes almost 40,000 cancers every year in the United States.¹ These include six types of cancer, including mouth and throat, cervix, vulva, vagina, penis, and anus.

Safety

What's known

Data have shown that HPV vaccination is safe. Over 150 countries recommend the HPV vaccine and have provided hundreds of millions of doses.² It is one of the most studied and safest medications available.

Vaccination can cause mild pain or soreness at the injection site for two to three days. Because adolescents have a higher risk of fainting after vaccination or blood draw, they should sit for 15 minutes after the shot. The HPV vaccine has no unexpected serious adverse events.^{3,4}

Randomized trials and long-term observation of vaccinated individuals since 2006 have all shown that HPV vaccination is safe for children and adults. Two decades of continuous safety monitoring using best methods continue to show the safety of the HPV vaccine and no serious long-term side effects.²

What's new from 2021-2025

Data from recent studies continue to confirm that the HPV vaccine is safe.

- A 2022 observational study confirmed that HPV vaccination is safe. No association with severe health events was found using data from the Vaccine Safety Datalink for 1.8 million HPV vaccine doses in the US administered between October 4, 2015, through January 2, 2021.⁵
- HPV vaccination is not associated with lupus, rheumatoid arthritis, or other autoimmune diseases as demonstrated in systematic reviews.^{6,7}

What's next

The US continues to monitor several vaccine safety systems to ensure that the HPV vaccine is safe.

Effectiveness

What's known

HPV vaccination prevents six cancers in men and women. The vaccine:

- Prevents more than 90% of HPV-related cancers when delivered during early adolescence
- Reduces HPV infections of the cervix and mouth and throat by 90%
- Prevents genital warts and recurrent respiratory papillomatosis (warts in the airway)

The American Cancer Society (ACS) recommends routine HPV vaccination starting at age 9 because of clear evidence of its safety and effectiveness.⁸

What's new from 2021-2025

Results of studies have demonstrated the ways that HPV vaccination improves people's health.

- Cervical cancer rates decreased by 69% among young women ages 20-24 years, between 2013 and 2021 in the US. This is the first cohort of individuals to get HPV vaccination as adolescents.⁹
- No cases of cervical cancer were detected in a 2024 national surveillance study of 448,000 young women ages 23-25 years who were vaccinated at ages 12-13 years in Scotland.¹⁰
- Anal cancers and high-grade anal precancers decreased by 70% in young women vaccinated before age 17 in a 2024 national observational study in Denmark.¹¹
- HPV infections decreased by 81% for women ages 20-24 years and 88% for those ages 14-19 years in a 2021 national observational study in the US.¹²
- Mouth and throat HPV infections decreased by up to 90% in HPV-vaccinated people, according to systematic reviews in 2021-2023.¹³⁻¹⁶
- One HPV vaccine dose has demonstrated noninferior efficacy in protection against HPV16 or HPV18 infection and may be effective for cervical cancer prevention for most people, according to emerging evidence across multiple studies.^{17,18} However, important data gaps remain, and ACS still recommends two doses.⁸

What's next

In the next three to five years, research studies will continue to monitor the impact of HPV vaccination on cancer cases. We expect to see important findings on the effectiveness of HPV vaccination for reducing:

- Mouth and throat cancer, an important clinical target given that it is the most common HPV cancer and no routine screening test exists for it¹⁴
- HPV infections and HPV precancers in people ages 27-45 years
- HPV precancers and HPV cancer cases over the long term in people who receive one dose of the HPV vaccine

References

1. Centers for Disease Control and Prevention. Cancers Linked with HPV Each Year. Updated December 3, 2025. Accessed December 15, 2025. <https://www.cdc.gov/cancer/hpv/cases.html>.
2. Donahue JG, Kieke BA, Lewis EM, et al. Near Real-Time Surveillance to Assess the Safety of the 9-Valent Human Papillomavirus Vaccine. *Pediatrics*. 2019;144(6):e20191808. doi:10.1542/peds.2019-1808.
3. Human Papillomavirus (HPV) Vaccines. National Cancer Institute. Updated May 25, 2021. Accessed January 14, 2026. <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet>.
4. HPV Vaccination. Centers for Disease Control and Prevention. Updated August 20, 2024. Accessed January 14, 2026. <https://www.cdc.gov/hpv/vaccines/>.
5. Sundaram ME, Kieke BA, Hanson KE, et al. Extended surveillance to assess safety of 9-valent human papillomavirus vaccine. *Hum Vaccin Immunother*. 2022;18(7):2159215. doi:10.1080/21645515.2022.2159215.
6. Wang M, Gu H, Zhai, et al. Vaccination and the risk of systemic lupus erythematosus: a meta-analysis of observational studies. *Arthritis Res Ther*. 2024;26(1):60. doi:10.1186/s13075-024-03296-8.
7. Pan H, Yu Y, Li X, et al. Vaccination and rheumatoid arthritis: an updated systematic review and meta-analysis of data from 25,949,597 participants. *BMC Public Health*. 2025;25(1):933. doi:10.1186/s12889-025-22093-9.
8. Saslow D, Andrews KS, Manassaram-Baptiste D, Smith RA, Fontham ETH; American Cancer Society Guideline Development Group. Human papillomavirus vaccination 2020 guideline update: American Cancer Society guideline adaptation. *CA Cancer J Clin*. 2020;70(4):274-280. doi:10.3322/caac.21616.
9. Siegel RL, Kratzer TB, Giaquinto AN, Sung H, Jemal A. Cancer statistics, 2025. *CA Cancer J Clin*. 2025;75(1):10-45. doi:10.3322/caac.21871.
10. Palmer TJ, Kavanagh K, Cuschieri K, et al. Invasive cervical cancer incidence following bivalent human papillomavirus vaccination: a population-based observational study of age at immunization, dose, and deprivation. *J Natl Cancer Inst*. 2024;116(6):857-865. doi:10.1093/jnci/djad263.
11. Baandrup L, Maltesen T, Dehlendorff C, Kjaer SK. Human papillomavirus vaccination and anal high-grade precancerous lesions and cancer—a real-world effectiveness study. *J Natl Cancer Inst*. 2024;116(2):283-287. doi:10.1093/jnci/djad189.
12. Rosenblum HG, Lewis RM, Gargano JW, Unger ER, Markowitz E. Decline in Prevalence of Human Papillomavirus Vaccine-Type Infection Among Females after Introduction of Vaccine – United States, 2003-2018. *MMWR Morb Mortal Wkly Rep*. 2021;70(12):415-420. doi:10.15585/mmwr.mm7012a2.
13. Nielsen KJ, Jakobsen KK, Jensen JS, Grønhoj C, Von Buchwald C. The Effect of Prophylactic HPV Vaccines on Oral and Oropharyngeal HPV Infection – A Systematic Review. *Viruses*. 2021;13(7):1339. doi:10.3390/v13071339.
14. Kaczmarczyk KH, Yusuf H. The impact of HPV vaccination on the prevention of oropharyngeal cancer: A scoping review. *Community Dent Health*. 2022;39(1):14-21. doi:10.1922/CDH_00072 Kaczmarczyk08.
15. Macilwraith P, Malsem E, Dushyanthen S. The effectiveness of HPV vaccination on the incidence of oropharyngeal cancers in men: a review. *Infect Agent Cancer*. 2023;18(1):24. doi:10.1186/s13027-022-00479-3.
16. Tsentemidou A, Fyrmpas G, Stavrakas M, et al. Human Papillomavirus Vaccine to End Oropharyngeal Cancer. A Systematic Review and Meta-Analysis. *Sex Transm Dis*. 2021;48(9):700-707. doi:10.1097/OLQ.0000000000001405.
17. Fokom-Defo V, Dille I, Fokom-Domgue J. Single dose HPV vaccine in achieving global cervical cancer elimination. *Lancet Glob Health*. 2024;12(3):e360-e361. doi:10.1016/S2214-109X(24)00009-3.
18. Kreimer AR, Porras C, Liu D, et al. Noninferiority of One HPV Vaccine Dose to Two Doses. *N Engl J Med*. Published online December 3, 2025. doi:10.1056/NEJMoa2506765.

The American Cancer Society National HPV Vaccination Roundtable convenes, communicates with, and catalyzes member organizations to increase HPV vaccination rates and prevent HPV cancers.

Visit hpvroundtable.org to learn more.

