Achieving an 80% HPV vaccination rate could eliminate nearly 1 million cases of male oropharyngeal cancer this century

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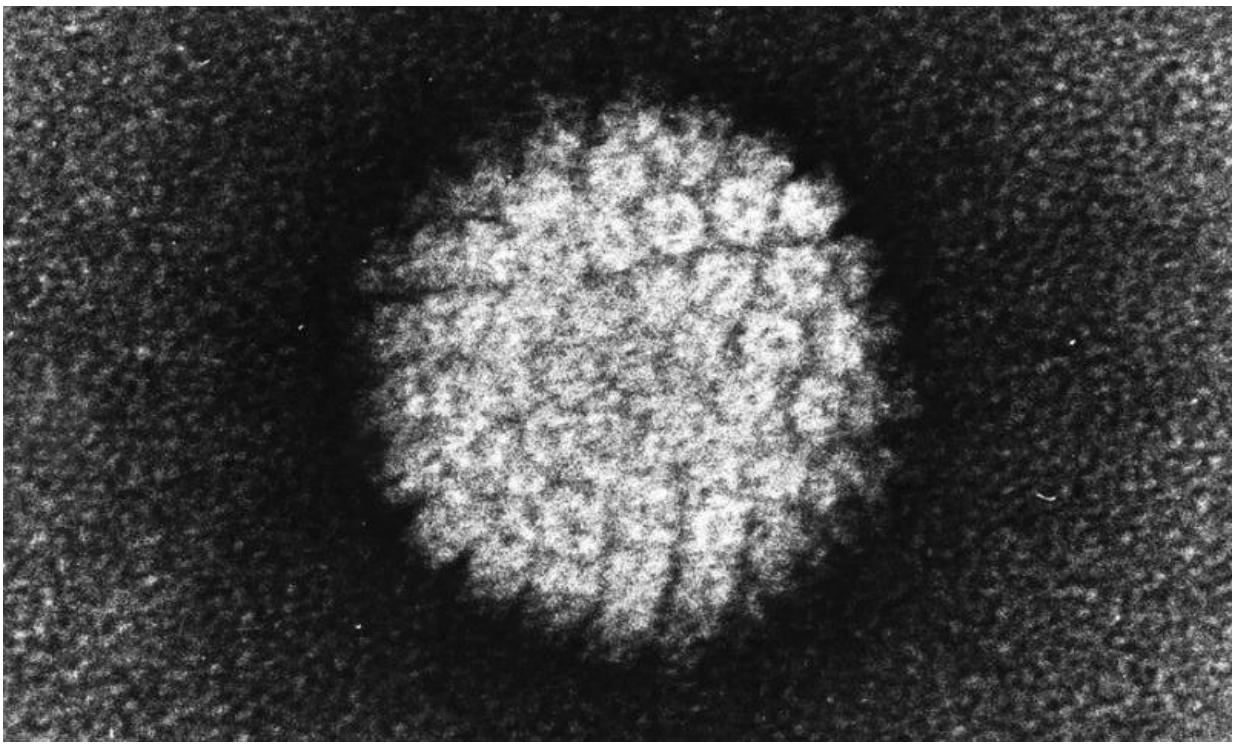

Electron micrograph of a negatively stained human papilloma virus (HPV) which occurs in human warts. Credit: public domain

A nationwide effort to adequately vaccinate 8 in 10 adolescents against the human papillomavirus (HPV) could prevent 934,000 cases of virus-

associated, male oropharyngeal cancer over this century, reported investigators at The University of Texas Health Science Center at Houston (UTHealth Houston) School of Public Health in *The Lancet Regional Health—Americas*.

At the start of each decade, the Healthy People program of the U.S. Department of Health and Human Services establishes goals to reduce the most significant preventable threats to health, which include an 80% target for the HPV vaccination program. However, in the U.S., just 54% of adolescents and only 21% of young adults were adequately vaccinated as of 2019.

To gage the effect of accomplishing an 80% target on male oropharyngeal cancer, the most common cancer caused by HPV, UTHealth Houston researchers created a simulation model to project the development of this cancer over a lifetime and to measure the impact of the HPV vaccination.

"Our study is the first to develop and validate a comprehensive mathematical modeling framework of the natural history of oral HPV infection and its progression to oropharyngeal cancer," said Ashish A. Deshmukh, Ph.D., MPH, the study's senior author and an associate professor in the Department of Management, Policy and Community Health and associate director of the Center for Health Services Research at UTHealth School of Public Health.

"Achievement of the 80% goal by 2025 and maintaining it could lead to the prevention of 934,000 oropharyngeal cancers and could lead to its elimination by late 2070s; whereas, maintaining the current vaccination rate of 54% could prevent 792,000 cases but oropharyngeal cancer elimination will not occur by the end of the century," Deshmukh said.

Haluk Damgacioglu, Ph.D., the study's lead author and a postdoctoral

research fellow at UTHealth School of Public Health, said, "We are in an era of declining cancer incidence and mortality. Oropharyngeal cancer is one of only a few cancers that is rising rapidly."

"This work is a clear and important reminder that to prevent avoidable suffering and death from HPV-related cancer in our future, we must act by protecting adolescents in our present," said Gary M. Clifford, Ph.D., study co-author and deputy head of the Branch of Early Detection, Prevention and Infections of the International Agency for Research of Cancer, a part of the World Health Organization.

HPV is the leading cause of cancer in the oropharynx, the middle part of the throat, behind the oral cavity. There are approximately 16,000 cases of oropharyngeal cancer in the United States annually, and more than 70% are caused by HPV, Damgacioglu said.

The vaccine prevents nearly all cancer-causing infections. The Advisory Committee on Human Immunization Practices of the Centers for Disease Control and Prevention recommends HPV vaccination at 11 to 12 years of age and catchup vaccinations through age 26.

Anna R. Giuliano, Ph.D., study co-author and director of the Center for Immunization and Infection Research in Cancer at the Moffitt Cancer Center in Tampa, Florida, added, "Results from our study clearly demonstrate the potential HPV vaccination holds for preventing tens of thousands of oropharyngeal cancers in the U.S., just one of six cancers HPV causes in men and women."

Heavy lifting will be needed to meet the 80% goal. Last year during the peak of the COVID-19 pandemic, HPV vaccination rates plummeted by more than half and have continued to remain lower than in prior years. The COVID-19-related vaccine drop and potential delays in recovery could lead to as many as 6,200 additional cases of male oropharyngeal

cancer through the century, reported the authors.

The keys to reaching this vaccination milestone, according to Deshmukh, include addressing the vaccine safety concerns of parents, stronger recommendations from health care providers, and correcting erroneous online information.

The projection was made with the first HPV natural history simulation model that captures a host of factors including the efficacy of the vaccine, the virulence and persistence of the HPV genotypes, the susceptibility of different groups, and the effects of herd immunity, Deshmukh said.

Predicting the long-term impact of HPV-associated oropharyngeal cancer is challenging because the cancer is slow-developing and natural history is complex. "Such analysis is not possible without using state-of-the-art modeling," said Damgacioglu, noting the importance of modeling studies to understand the long-term impact of HPV vaccination for cancer prevention.

More information: Ashish A. Deshmukh et al, Long-term impact of HPV vaccination and COVID-19 pandemic on oropharyngeal cancer incidence and burden among men in the USA: A Modeling Study, *The Lancet Regional Health—Americas* (2021).

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