

The Dynamics of an Epidemiological Model for HPV with Partial Vaccination in a Heterogeneous Population

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1 Abstract

The Human papillomavirus (HPV) is one of the most prevalent sexually transmitted diseases in the United States. HPV-16 and HPV-18 are the primary agents of cervical cancer, and HPV-6 and HPV-11 are responsible for most genital warts and juvenile-onset recurrent respiratory papillomatosis. Highly efficacious vaccines have been developed to prevent these high-risk types of HPV, which are typically administered in three doses. However, younger adolescents need only two-doses of the full three-dose vaccine regimen [CDC]. We propose and analyze a mathematical model that investigates the implications of the population not completing the vaccine regimen as well as the scenario of younger adolescents receiving two-dosages. Our model finds a sufficient, vaccination strategy for certain age groups based on gender and the number of sexual partners. By having differing age groups, the model can target a specific age group for vaccination to optimize the control of HPV spread, which could lead to the eradication of the disease.

CDC Recommends only Two HPV Shots for Younger Adolescents, 2016. *Centers for Disease Control and Prevention*, <https://www.cdc.gov/media/releases/2016/p1020-hpv-shots.html>.