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 papillomatoses. 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.