

## Modeling the natural history of human papillomavirus (HPV) among homosexual males

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The recently developed vaccines against several types of human papillomavirus (HPV) have been targeted at girls and young women with the aim of preventing cervical cancer. However, HPV infections also affect men, potentially causing anogenital cancers and cancers of the head and neck. One HPV vaccine, Gardasil, has been approved for use in males. In order to guide strategies for vaccination among males, we seek to model the natural history of HPV infection and HPV-caused cancers among homosexual males. Preliminary modeling of interaction between infected and uninfected individuals shows two equilibrium states, one HPV-free and one with endemic HPV infection. In this model, we find there exists a critical value for the rate of HPV transmission below which the HPV-free equilibrium state is stable. Above this critical infectivity rate, the endemic HPV equilibrium state is stable. The critical infectivity depends on the death rate for susceptible individuals, the rate of inflow into the susceptible population, the rate of recovery from HPV infection, and the rate of death for individuals infected with HPV. Our next step is to develop a model that includes cancerous and precancerous states.