

io-port 06028563**Lee, Sunmi; Golinski, Michael; Chowell, Gerardo****Modeling optimal age-specific vaccination strategies against pandemic influenza.**

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Summary: In the context of pandemic influenza, the prompt and effective implementation of control measures is of great concern for public health officials around the world. In particular, the role of vaccination should be considered as part of any pandemic preparedness plan. The timely production and efficient distribution of pandemic influenza vaccines are important factors to consider in mitigating the morbidity and mortality impact of an influenza pandemic, particularly for those individuals at highest risk of developing severe disease. We use a mathematical model that incorporates age-structured transmission dynamics of influenza to evaluate optimal vaccination strategies in the epidemiological context of the Spring 2009 A (H1N1) pandemic in Mexico. We extend previous work on age-specific vaccination strategies to time-dependent optimal vaccination policies by solving an optimal control problem with the aim of minimizing the number of infected individuals over the course of a single pandemic wave. Optimal vaccination policies are computed and analyzed under different vaccination coverages (21%–77%) and different transmissibility levels (\mathcal{R}_0 in the range of 1.8–3). The results suggest that optimal vaccination can be achieved by allocating most vaccines to young adults (20–39 yr) followed by school age children (6–12 yr) when the vaccination coverage does not exceed 30%. For higher \mathcal{R}_0 levels ($\mathcal{R}_0 \geq 2.4$), or a time delay in the implementation of vaccination (> 90 days), a quick and substantial decrease in the pool of susceptibles would require the implementation of an intensive vaccination protocol within a shorter period of time. Our results indicate that optimal age-specific vaccination rates are significantly associated with \mathcal{R}_0 , the amount of vaccines available and the timing of vaccination.

Keywords: A/H1N1 pandemic; optimal control

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