



Area of Excellence CONTROL OF PANDEMIC AND INTER-PANDEMIC INFLUENZA

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The Impact of Stratified Immunity on the Transmission Dynamics of Influenza

by

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Seminar Room 3, G/F Laboratory Block
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Abstract:

Epidemic models of influenza are often used for pandemic planning, control and mitigation but the actual number of the cases that changes over time is often difficult to obtain. Seroprevalence of the influenza provides a more accurate way to estimate actual number of infected cases than Influenza-like Illness. However, despite the widespread availability of serological data, epidemic models have thus far not explicitly represented antibody titre levels and their correspondence with immune protection. Influenza epidemics are often described under the assumption that individuals are either susceptible or not. We develop a serological model of influenza in which antibody titre classes are enumerated explicitly and mapped onto a variable scale of susceptibility in different age groups. Markov chain Monte Carlo is used to fit the model to serological data from the 2009 H1N1 pandemic in Hong Kong based only on pre- and post-wave serological data. We demonstrate that with stratified immunity, the timing and the magnitude of the epidemic dynamics can be reconstructed more accurately than is possible with binary seropositivity data. We also show that increased infectiousness of children relative to adults and age-specific mixing are required to reproduce age-specific seroprevalence observed in Hong Kong, while pre-existing immunity in the elderly is not. Our results suggest that stratified immunity in an aged-structured heterogeneous population plays a significant role in determining the shape of influenza epidemics.

ALL ARE WELCOME