Modelling the strategies for age specific vaccination scheduling during influenza pandemic outbreaks

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The A(H1N1)v is a subtype of influenza A virus which appeared in March 2009. Finding optimal policies to reduce the morbidity and mortality for influenza pandemics is a top public health priority. Using a compartmental model with age structure and vaccination status, we examined the effect of age specific scheduling of vaccination during a pandemic infuenza outbreak, when there is a race between the vaccination campaign and the dynamics of the pandemic. Our results agree with some recent studies on that age specifcity is paramount to vaccination planning. However, little is known about the effectiveness of such control measures when they are applied during the outbreak. We found that without reallocating any vaccines between age groups, the best scheduling scheme can decrease the overall attack rate by up to 10%. We demonstrate the importance of early start of the vaccination campaign, since ten days delay may increase the attack rate by up to 6%. Taking into account the delay between developing immunity and vaccination is a key factor in evaluating the impact of vaccination campaigns. We provide a general framework which will be useful for the next pandemic waves as well. The applicability of our population dynamic model is demonstrated for the first wave of A(H1N1)v in Hungary.

Keywords: pandemic influenza, vaccination strategies, compartmental models, system of differential equations

References

[1] D. Knipl & G. Röst, Modelling the strategies for age specific vaccination scheduling during influenza pandemic outbreaks, submitted