Proposal method to improve 2015/2016 flu vaccine effectiveness

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Keywords:
entire virus
clades
virus-like particles
antigenic drift
rapid cycle evaluation

Introduction
Government provides free seasonal influenza vaccination to target population from 1st Nov 2015 to 31st March 2016. This vaccine protects against H1N1, H3N2, and influenza B viruses. However, the protection efficiency is estimated to be 20% in 2015 only due to the antigenic drift. Only 48% of influenza A (H3N2) viruses collected in 2014 were antigenically “like” the 2014-2015 influenza A (H3N2) vaccine component. Traditional vaccine production (using entire virus) requires 4-6 months to manufacture. Virus is grown in eggs, then purified and killed with formaline and detergent. The killed viruses are used as vaccine to stimulate the immune system. Time factor explains why new flu vaccine cannot be produced in the same year. Łuksza and Lässig, predicted the related H3N2 strains, known as clades, by considering the mutations in sites that bind / not binding antibodies, and the recent frequencies of the clade and competing clades. Biotech Company Novavax uses virus-like particles (VLP) to manufacture vaccine in 10-12 weeks. Influenza infected cell produces new viral particles by budding. These budding contains viral RNA particles and viral proteins like PA, PB1/2, NP, M1/2, HA, NA. Using viral vector, we can deliver genes coding for HA, NA, and M1 to form viral-like particles in cell culture, that are not infectious but immunogenic. In Hong Kong, respiratory specimens received during Aug 3 – 9, 2014, 87 (5.3%) were tested positive for seasonal influenza viruses. Using this data, VLP vaccine can be made in early November.

Objectives
Reduce the impact of rapid antigenic-drift of seasonal influenza by “rapid cycle evaluation” using VLP vaccine
**Methodology**
Manufacture the VLP vaccine using the data of influenza strains obtained in August 2015. The incidence and mortality rate of seasonal influenza are compared with previous years. Comparison is by student t-test with \( p<0.05 \) being statistically significant. Egg allergy is not a contraindication for VLP vaccine.

**Result**
As this is a proposal, only expected outcome will be described. Provide that most people receive the “New Vaccine”, the herd immunity will increase and the corresponding mortality rate will decrease. Vaccine safety and effectiveness raise concern. The rapid mutation rate of influenza virus makes the prediction of the effectiveness of traditional seasonal vaccine just like predicting the weather. However, there will be wasting of money if the prediction is being correct. Due to the relative high incidence of influenza-like illness (7.21 per 1000 general outpatient clinics consultations, 57.9 per 1000 private doctors consultations in 2015), it is still worthwhile to consider this proposal.