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EDITORIAL

Do we need pre-pandemic influenza vaccine?

Masoud Mardani*
Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University, M.C., Tehran, Iran

By end of 2008, 48 countries have planned strategic pre-pandemic program against influenza. Strategic planning for a new influenza pandemic is now a top global public health priority. Influenza prevention can be considered under the broad categories of antiviral, vaccine and non-pharmaceutical (case isolation, household quarantine, school or work place closure, and restriction on travelers). The World Health Organization (WHO) has advocated that countries should develop pandemic preparedness plans to control or mitigate the effects of a future influenza pandemic (2). The availability of a safe and effective pandemic influenza vaccine that can be used to vaccinate the world population preventively, would be the most effective and cost-effective way to combat such a disaster.

The influenza virus on which the pandemic vaccine should be based is not known. Obviously, the highly pathogenic avian influenza virus (HPAI) H5N1, which has spread in an unprecedented large area in the past decade, should be considered a serious candidate. However, other avian influenza viruses, like the H7N7 and H9N2 subtypes that have recently infected large numbers of humans, are among the candidates that may be at the basis of the next pandemic influenza virus.

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Reprint or Correspondence: Masoud Mardani, MD.
Infectious Diseases and Tropical Medicine Research Center
Shahid Beheshti University, M.C., Tehran, Iran.
E-mail: mmardani@hotmail.com

The current global production capacity of trivalent seasonal influenza vaccine is about 400 million doses per year. With a world population of more than 6.5 billion people and the probability that two vaccine doses should be used in a largely naive population, it should be envisaged that about 13 billion doses of pandemic vaccine would be required for adequate pandemic preparedness.

The time needed from the moment that the vaccine seed virus is available until the first vaccine dose can be used, is currently 4 months at best. Almost a century ago, when steamboats dominated world travel, the pandemic “Spanish flu” virus spread around the world within a mere 3 months. Consequently, the time needed to manufacture vaccines today, coupled with the ease and accessibility of air travel (allowing the pandemic influenza virus to spread more quickly than before), will in fact require a pandemic vaccine to become available after the start of the pandemic period, likely after the first wave, or rather, as a post-pandemic vaccine.

Now, there are only three options: sit back and wait, vaccinate now, or stockpile a candidate pandemic vaccine.

Stockpiling a candidate pandemic vaccine is currently considered by the WHO (3) and seems to be the most attractive strategy available. Data that have recently been presented at scientific meetings have shown that certain influenza vaccines adjuvanted with proprietary adjuvants provide a

degree of intra-subtypic cross-reactivity against drifted H5N1 influenza virus strains and this is achieved in an antigen sparing way. This has resulted in broad protection from heterologous intra-subtypic challenge infection. Stockpiling of such a candidate pandemic vaccine would offer the opportunity to start vaccination directly at the onset of the pandemic, thus slowing its spread and reducing morbidity and mortality of the vaccinated population. Attempts to contain the spread of the disease by ring vaccination, as is the policy with the application of veterinary vaccines in the face of an outbreak, might also form a plank of the policy at the time of a new outbreak. Crucial elements of such a pre-pandemic stockpiling strategy are: the viral antigens should be easily replaceable to match newly emerging virus strains. In addition, in case of a drifted strain of the same subtype, the stockpiled antigen can be used for priming, which will then be followed by a boost with the vaccine containing the well-matched antigen within months. Meanwhile, in case of a virus of another subtype, the antigen should be replaceable within months to allow early pandemic vaccination. Finally, it should be possible to store the adjuvant separately from the antigen and it should have a long shelf life. Preferably, the adjuvant should be effective in seasonal influenza vaccines for high risk groups, allowing annual replacement for a portion of the adjuvant stockpile, which continuously keeps the stockpile refreshed.

According to this strategy, the vaccination component of the pandemic preparedness plan recommended by WHO (2), should contain two key elements: First, separate stockpiling of adjuvant and rapidly replaceable viral antigen, and second, sufficient vaccine production capacity to produce the matched viral antigen within months. This can best be achieved by increasing today, seasonal trivalent influenza vaccine manufacturing for up to 30% of the population (4).

In Iran, Technical Committee of Influenza is responsible for strategic planning of influenza. Besides social and personal hygienic guidelines, this committee has recommended annual influenza vaccination for high risk population and chronic patients. Meanwhile, since the onset of influenza epidemic, the committee has focused on the issue monitor the corresponding threat of influenza. At least 22 frontline committees are actively cooperated with WHO reference laboratory in Tehran for early detection of newly developed influenza cases. Their periodic reports are presented to WHO. At the mean time, Iranian Veterinary Organization equipped its laboratories all around the country with the latest diagnostic techniques, including PCR, and wipe out all the infected birds. Furthermore, preparing standard isolated rooms in general hospitals all around the country, surveillance management, and early detection of influenza cases are the main activities of the Iranian Technical Committee of Influenza. This committee believes that the stockpiling strategy of pre-pandemic vaccine is the most attractive available strategy and should be considered in our country, of course, after more thorough studies in this regards.

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