衞生防護中心
Centre for Health Protection

Scientific Committee on Vaccine Preventable Diseases

Recommendations on Seasonal Influenza Vaccination for the 2019-20 Season in Hong Kong

(As of April 10, 2019)

Introduction

Seasonal influenza causes a significant disease burden in Hong Kong. Since 2004, the Scientific Committee on Vaccine Preventable Diseases (SCVPD) reviews the scientific evidence of influenza vaccination and makes recommendations on influenza vaccination in Hong Kong annually. This document sets out the scientific evidence, local data as well as overseas practices, and provides recommendations in relation to the use of seasonal influenza vaccination in Hong Kong for the 2019-20 season.

Global Situation of the 2018/19 Winter Influenza Season

2. In the temperate zone of the northern hemisphere, influenza activity started to increase in November 2018. Influenza A viruses circulated in far greater numbers than influenza B viruses. Among subtyped influenza A viruses, A(H1N1)pdm09 was the predominant subtype in most countries in Europe, North America, and eastern and western Asia, while A(H3N2) was predominant in most countries in northern Africa and some countries in Europe and Asia.

3. In the United States (US), the 2018/19 winter influenza season started in December 2018. Influenza A(H1N1)pdm09 predominated from October to mid-February and influenza A(H3N2) had been more commonly identified since late February. The highest rate of hospitalisation was among adults aged 65 years or above, followed by adults aged 50-64 years and children aged 0-4 years. In Canada, influenza activity crossed the seasonal threshold in late October 2018, which was an earlier start of the influenza season than in recent years. The activity of influenza A(H1N1)pdm09 peaked at the end of December 2018 with a second smaller wave dominated by influenza A(H3N2) being observed in March 2019.

4. In Europe, influenza activity based on sentinel sampling exceeded a positivity rate of 10% in early December 2018 and peaked in late January 2019. Both influenza A virus subtypes had circulated, with co-circulation in some countries while others reported dominance of either influenza A(H1N1)pdm09 or A(H3N2). Countries in eastern Asia (e.g. Mainland China, Japan and Korea) experienced high influenza activity which peaked mostly in January with predominance of influenza A(H1N1)pdm09. Increased detections of influenza A(H3N2) and B viruses were reported in the later phase of the season.

Summary of the 2018/19 Winter Influenza Season in Hong Kong

5. The 2018/19 winter influenza season in Hong Kong started in the first week of 2019. The overall seasonal influenza activity had increased sharply in the first few weeks of January to the peak level around mid to late January. It had continued to decrease steadily since early February and returned to the baseline level in early April.

6. The laboratory surveillance data of the Centre for Health Protection (CHP) of the Department of Health showed that the percentage of respiratory specimens tested positive for influenza viruses by the Public Health Laboratory Services Branch reached the peak of about 30% in mid-January. In this season, about 76% of the positive influenza detections were influenza A(H1N1)pdm09, followed by influenza A(H3N2) (21%). The percentage of respiratory specimens tested positive for influenza B remained at a low level throughout this season.

7. In this season, a large number of institutional outbreaks of

influenza-like illness (ILI) was recorded with the majority occurring in kindergartens/child care centres (KG/CCC) and primary schools. A total of 864 ILI outbreaks were recorded in this season, which exceeded the total numbers recorded in major influenza seasons since 2013. About 61% and 21% of the reported outbreaks occurred in KG/CCC and primary schools respectively. For the assessment of ILI outbreaks by the moving epidemic method (MEM)*, the weekly number in KG/CCC had reached the ***very high*** intensity level from the second to fourth week of January while the highest weekly numbers in primary schools and residential care homes for the elderly were at the medium intensity level.

8. The influenza-associated hospital admission rates reached the peak in mid to late January 2019. The peak weekly rate was highest among young children <5 years, followed by elderly ≥65 years and children 6-11 years. The peak rate among children <5 years in this season had exceeded the respective highest level recorded in previous seasons since 2010. For the assessment of influenza-associated admission rates by MEM, the weekly rate among young children <5 years had reached the high intensity level in the second and third week of January while the highest weekly rates among children aged 6-11 years and elderly ≥65 years were at the medium intensity level.

9. For the surveillance of severe influenza cases (intensive care unit [ICU] admission or death) among adult patients (≥18 years), a total 601 cases (including 356 deaths) were recorded in this season. The number of adult severe influenza cases was comparable to that recorded in the 2017/18 winter season. About 26% of the adult severe cases affected persons aged 50-64 years, which was higher than 15% in the 2017 summer season predominated by influenza A(H3) and 20% in the 2017/18 winter season predominated by influenza B. Nonetheless, most of the deaths (87%) still affected elderly ≥65 years. About 78% had pre-existing chronic medical diseases. Only 26% were known to have received the seasonal influenza vaccine (SIV) for the 2018/19 season.

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* From 2019, the CHP has piloted to use intensity levels established by MEM for two influenza surveillance parameters in Hong Kong: (i) weekly number of ILI outbreaks (reflecting the transmissibility of seasonal influenza in the community); and (ii) weekly influenza-associated admission rate in public hospitals (reflecting the clinical severity of season influenza). Three intensity thresholds, namely medium, high and very high, were calculated using MEM for each of the above surveillance parameters based on the corresponding historical data for objective comparisons of the t data with the historical data.

10. For paediatric cases of influenza-associated severe complications and deaths, 24 cases (including one death) were recorded in this season. The number of cases was within the range recorded in major influenza seasons in the past few seasons. Their ages ranged from one month to 15 years with a median of four years. Thirteen (54%), eight (33%) and three (13%) cases were aged 0-5, 6-11 and 12-17 years respectively. Only 27% had received the SIV for the 2018-19 season[†], which was much lower than the estimated coverage of free or subsidised SIV (46%) among children 6 months to 11 years in the 2018/19 season.

Influenza Vaccines

Vaccine Types

11. Influenza vaccination is one of the effective means in preventing influenza and its complications together with reduction in influenza-associated hospitalisation and death. In Hong Kong, currently registered SIVs include inactivated influenza vaccines (IIVs) and a live attenuated influenza vaccine (LAIV)[‡].

12. Two distinct lineages of influenza B (namely the Yamagata and Victoria lineages) have circulated worldwide. Trivalent SIV consist of three seasonal influenza viruses: one influenza A (H1N1)pdm09 virus, one influenza A (H3N2) virus and one influenza B virus (either a Yamagata or Victoria lineage), while quadrivalent SIV consist of an additional influenza B virus of the lineage not contained in the trivalent SIV. Studies on quadrivalent SIV showed that the addition of the second influenza B strain did not result in immune interference to other strains included in the vaccine. Moreover, the rates of adverse events following trivalent and quadrivalent SIVs were similar. It is expected that quadrivalent SIV could provide additional protection against influenza B, especially in seasons predominated by influenza B viruses[§].

13. SIV requires annual administration. Most IIVs are given via the

[†] Excluding two infant cases aged below 6 months in the calculation because babies below 6 months of age could not receive SIV.
[‡] Adjuvanted IIV, high-dose IIV and recombinant influenza vaccine are not available in Hong Kong in the upcoming 2019-20 season.
[§] The 2017/18 winter season in Hong Kong was predominated by influenza B which constituted about 75% of the positive influenza detections. Among the influenza B detections, about 95% belonged to the Yamagata lineage which was only included in the QIV for that season.

intramuscular route and are recommended for use in individuals six months of age or above except those with known contraindications (depending on individual brand). Only one type of LAIV (Flumist) is available on the local market for use in individuals aged two to 49 years, and it should be given intranasally.

Vaccine Effectiveness

14. Vaccination remains one of the most efficacious public health tools currently available to protect individuals against influenza. Vaccine effectiveness (VE) depends on the similarity between the virus strains present in the vaccine and those circulating in the community. According to the World Health Organization (WHO), when the vaccine strains closely match the circulating influenza viruses, efficacy of IIVs in individuals younger than 65 years of age typically range from 70% to 90%, whereas the efficacy of IIVs in prevention of influenza infection in individuals aged 65 years or above is at best modest, irrespective of setting, population and study design. For elderly, a meta-analysis study found that the VE of SIV against laboratory-confirmed influenza in community-dwelling elderly people during influenza seasons was 44% in matched seasons and 20% in mismatched seasons.[**] Another meta-analysis study showed that the pooled VE of SIV against influenza-associated hospitalisations was 37% among adults aged 65 years or above between 2010/11 and 2014/15.[††]

15. For LAIV, overseas studies and clinical experience had generally indicated LAIV to be a safe vaccine, providing comparable protection against influenza to that afforded by IIVs. The current evidence does not support a recommendation for the preferential use of LAIV.

16. Previously, there were concerns on poor VE of LAIV against influenza A(H1N1)pdm09, but these data were mainly from the US before the 2016/17 season. A study conducted in Canada from the 2012/13 to 2015/16 seasons found that there were no significant differences in the odds of influenza

[**] Darvishian M, van den Heuvel ER, Bissielo A, et al. Effectiveness of seasonal influenza vaccination in community-dwelling elderly people: an individual participant data meta-analysis of test-negative design case-control studies. Lancet Respir Med. 2017 Mar;5(3):200-211.

[††] Rondy M, El Omeiri N, Thompson MG, et al. Effectiveness of influenza vaccines in preventing severe influenza illness among adults: A systematic review and meta-analysis of test-negative design ontrol studies. J Infect. 2017 Nov;75(5):381-394.

infection for LAIV recipients compared with IIV recipients, and there was no evidence to support the lack of effectiveness of LAIV against influenza A(H1N1)pdm09.‡‡ Another study conducted in Finland among children aged two years during the 2015/16 season revealed that the adjusted VE estimates were similar among the LAIV and IIV recipients (51% and 61%, respectively).§§

17. The poor VE of LAIV against influenza A(H1N1)pdm09 was postulated to be related to the H1N1 vaccine strain (A/Bolivia/559/2013) in triggering immune responses. The manufacturer has replaced the previous H1N1 strain with a new strain (A/Slovenia/2903/2015) since the 2017-18 season. Data from the manufacturer indicated that the new H1N1 component was shed by a higher proportion of children and it induced significantly higher antibody responses than the previous strain. Seroconversion rates to A/Slovenia/2903/2015 were comparable to those obtained in response to prepandemic influenza A(H1N1) LAIV strains used during seasons in which LAIV was observed to be effective against influenza A(H1N1) viruses.*** However, no data on VE of the LAIV with the new H1N1 component were available yet in the US for both 2017/18 and 2018/19 seasons.

18. LAIV has been extensively in use among children in the United Kingdom (UK). For the 2017/18 season, the adjusted VE of LAIV against medically-attended laboratory confirmed influenza among children and adolescents aged 2-17 years was 90.3% (95% confidence interval [CI]: 16.4 to 98.9) against influenza A(H1N1)pdm09 and 60.8% (95% CI: 8.2 to 83.3) against influenza B.††† These were higher than the corresponding figures for adults aged 18-64 years in which IIVs were mainly used: 69.1% (95% CI: 11.4 to 89.2) against influenza A(H1N1)pdm09 and 18.2% (95% CI: -15.1 to 41.9) against influenza B. In the 2018/19 season, the early season VE estimate of LAIV in primary care setting in the UK among persons aged 2-17 years was 87% (95%

‡‡ Buchan SA, Booth S, Scott AN, et al. Effectiveness of live attenuated vs inactivated influenza vaccines in children during the 2012-13 through 2015/16 influenza seasons in Alberta, Canada. JAMA Pediatr. 2018 Sep; 172(9): e181514.

§§ Nohynek H, Baum U, Syrjänen R, et al. Effectiveness of the live attenuated and the inactivated influenza vaccine in two-year-olds - a nationwide cohort study Finland, influenza season 2015/16. Eurosurveillance 2016 Sep 22;21(38).

*** Grohskopf LA, Sokolow LZ, Fry AM, et al. Update: ACIP Recommendations for the Use of Quadrivalent Live Attenuated Influenza Vaccine (LAIV4) - United States, 2018-19 Influenza Season. MMWR Morb Mortal Wkly Rep. 2018 Jun 8;67(22):643-645.

††† Public Health England. Influenza vaccine effectiveness in adults and children in primary care in the United Kingdom: provisional end-of-season results 2017-18. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/7794luenza_vaccine_effectiveness_in_primary_care_2017_2018.pdf

CI: 4 to 100) against influenza A(H1N1)pdm09, which was much higher than 39% (95% CI: -23 to 69) among adults aged 18-64 years in which IIVs were mainly used. ‡‡‡ This suggests that the new H1N1 virus strain (A/Slovenia/2903/2015) used since the 2017/18 season may have improved vaccine performance against circulating strains in the current 2018/19 season.

19. Upon reviewing the latest available data, the American Academy of Pediatrics will not express a preference for the type of SIV to be used in children during the coming 2019/20 season, unlike the 2018/19 season in which IIVs were recommended as the primary choice in children. §§§

20. Locally, since the 2017/18 season, the CHP has been collaborating with private medical practitioners participating in the sentinel surveillance system to study the VE of SIV at the local primary care setting using the test-negative case-control (TNCC) method. In the 2018/19 season, a similar study was conducted and 1,037 specimens were received from December 2018 to March 2019, with 55% tested positive for influenza viruses. The estimates revealed that the overall VE among all ages was 57.9% (95% CI: 42.0 to 69.7) against all influenza viruses and 60.2% (95% CI: 42.4 to 72.7) against influenza A(H1). Similar to the 2017/18 season, the results showed that the SIV for the 2018/19 season offered a moderate to good protection against laboratory-confirmed influenza at primary care level in Hong Kong. Another local hospital-based TNCC study involving about 2,000 children admitted to participating public hospitals between September 2018 and January 2019 with febrile acute respiratory illness and tested for influenza showed that the interim VE was 90% overall, and 92% against influenza A(H1). ****

Adverse Events

21. Adverse events following IIV administration may include local reactions including pain, redness and swelling at the site of injection (15-20%). Non-specific systemic symptoms including fever, chills, malaise and myalgia are

‡‡‡ Kissling E, Rose A, Emborg HD, et al. Interim 2018/19 influenza vaccine effectiveness: six European studies, October 2018 to January 2019. Eurosurveillance 2019 Feb;24(8).
§§§ AAP Updates Vaccine Recommendations for 2019-2020 Flu Season. Available at https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/AAP-Updates-Vaccine-Recommendations-for-2019-2020-Flu-Season.aspx
**** Chiu SS, Kwan MYW, Feng S, et al. Early season estimate of influenza vaccination effectiveness against influenza hospitalisation in children, Hong Kong, winter influenza season 2018/19. Euro ill. 2019 Jan;24(5).

reported in less than 1% of IIV recipients. Other rare adverse events may include anaphylaxis (nine per ten million doses distributed) and Guillain-Barré syndrome (GBS).

22. GBS is an acute paralyzing illness, usually provoked by a preceding infection, surgery or rarely after immunisation. It is characterised by progressive weakness of all limbs and areflexia. Recent extensive review which evaluated the risk of GBS after administration of influenza vaccines (excluding the 1976-1977 swine influenza vaccine) concluded that the evidence is inadequate to accept or reject a causal relationship between influenza vaccine and GBS.

23. Scientific studies over the years have shown an increased risk of GBS following influenza infection, and the magnitude of risk is much greater than that following influenza vaccination. Overseas studies have estimated that the risk of GBS following influenza vaccination was about one to two GBS cases per million vaccine recipients. This is much lower than the influenza mortality rates (number of death with laboratory confirmation of influenza within the same hospital admission per million population) of 33.4 –79.9 deaths per million population in Hong Kong among people aged 18 years or above in major influenza seasons during 2015-2019. Locally, a total of two GBS cases were recorded among persons who had received SIV (within the period of five days and six weeks after seasonal influenza vaccination) in the past five seasons (one case recorded in 2013/14 and another in 2015/16 respectively).[††††] No case was recorded in the 2018/19 season. In Hong Kong, the number of GBS (all causes) admitted to public hospitals ranged from 51 to 88 cases per year between 2014 and 2018.[‡‡‡‡]

24. For LAIV, the most common adverse reactions following LAIV administration are nasal congestion or runny nose in all ages, fever in children and sore throat in adults. The safety in pregnant women has not been established. Children aged below five years with recurrent wheezing / persons of any age with asthma may be at increased risk of wheezing following administration. As this is a live vaccine, there is potential for transmission of the vaccine viruses to

[††††] Causality assessment based on the WHO's classification (http://www.who.int/vaccine_safety/publications/gvs_aefi/en/) - Both cases in 2013/14 and 2015/16: B1 (Indeterminate; temporal relationship is consistent but there is insufficient definitive evidence for vaccine causing event)

[‡‡‡‡] Details are available from https://www.chp.gov.hk/en/features/26736.html

immunocompromised individuals.

Recommendations

25. The SCVPD made the following recommendations on seasonal influenza vaccination for the 2019-20 season in Hong Kong.

Vaccine Composition

26. The composition follows the recommendations by the WHO for the 2019-20 northern hemisphere influenza season. Recommended QIV to be used in the 2019-20 season (northern hemisphere winter) comprise an A/Brisbane/02/2018 (H1N1)pdm09-like virus, an A/Kansas/14/2017 (H3N2)-like virus, a B/Colorado/06/2017-like virus (B/Victoria/2/87 lineage), and a B/Phuket/3073/2013-like virus (B/Yamagata/16/88 lineage). The influenza B virus component of TIV for use in the 2019-20 season should be a B/Colorado/06/2017-like virus of the B/Victoria/2/87-lineage.

Vaccine Type

27. ***Both*** IIV and LAIV are recommended for use in Hong Kong. For IIVs, quadrivalent IIV is preferred to trivalent IIV due to the additional protection against one more lineage of influenza B offered by quadrivalent IIV. Depending on individual brand, IIVs are recommended for use among people aged six months of age or older, including healthy people and those with chronic medical problems. For LAIV which is a quadrivalent SIV, it can be used for people 2-49 years of age except those who are pregnant, immunocompromised or with other contraindications (refer to paragraph 33). The package inserts for individual products should always be referred to when deciding which vaccine to give.

Dosage and Dosing Schedule

28. Given that SIV offer protection against clinical influenza and severe cases do occur in previously healthy persons, all members of the public except those with known contraindications should receive SIV annually for personal protection, which is in line with the recommendation by the WHO. Members of the public should only receive SIV once in the 2019-20 season, which are expected to offer protection for both winter and summer season.

29. Healthcare providers should follow the age-appropriate dosage of individual vaccine in the respective package insert. A single dose of SIV is the standard regimen for persons aged nine years or above. Children below nine years, who have received one or more doses of SIV before are recommended to receive one dose of SIV in the 2019-20 season. Nevertheless, for vaccine-naive children aged below nine years, two doses of SIV with an interval of at least four weeks are required.[§§§§]

30. For individuals receiving LAIV, other live vaccines not administered on the same day should be administered at least four weeks apart, while other inactivated and live vaccines may be administered simultaneously or at any interval between doses.

Vaccine Precautions

31. SIV is contraindicated for those with a history of severe hypersensitivity to any of the vaccine components or a previous dose of influenza vaccination. Individuals with mild egg allergy who are considering an influenza vaccination can be given SIV in primary care setting. Individuals with a history of anaphylaxis to egg should have SIV administered by health care professionals in appropriate medical facilities with capacity to recognise and manage severe allergic reactions.

32. A study has shown that there may be a small increased risk of febrile convulsion following concomitant administration of IIV and pneumococcal vaccine in young children in the US, but the increased risk was not observed during subsequent influenza season and the overall risk remains acceptable. Given the obvious benefit of on-time vaccination with the two vaccines, it is recommended that IIV and pneumococcal vaccine can be given concomitantly.

33. LAIV is a live vaccine and is generally contraindicated in the

[§§§§] For the 2018-19 influenza season, most health authorities including the UK, Ireland, Canada, Australia and New Zealand recommended only 1 dose for children aged 6 months to 8 years who had received any SIV in the past. The UK even recommended that only 1 dose of LAIV was required for SIV-naïve children aged 2-17 years who were not in clinical risk groups. However, the US Centers for Disease Control and Prevention recommended that children aged 6 months through 8 years who had previously received ***less than 2*** total doses of trivalent or quadrivalent SIV at least 4 weeks apart before , 2018 required 2 doses in the 2018-19 season.

following conditions, taking reference from recommendations of the US, UK and Canada:

- History of severe allergic reaction to any vaccine component or after previous dose of any influenza vaccine;
- Concomitant aspirin or salicylate-containing therapy in children and adolescents;
- Children 2 years through 4 years who have asthma or who have had a history of wheezing in the past 12 month[*****];
- Children and adults who are immunocompromised due to any cause;
- Close contacts and caregivers of severely immunosuppressed persons who require a protected environment;
- Pregnancy; and
- Receipt of influenza antiviral medication within previous 48 hours.

Priority Groups

34. People who are in the priority groups are generally at increased risk of severe influenza or transmitting influenza to those at high risk. Therefore, they shall have higher priority for seasonal influenza vaccination. These priority groups have been determined based on a range of scientific considerations taking into account local disease burden and international experience.

35. The priority groups recommended in the 2018-19 season will continue to be included as priority groups for influenza vaccination in the 2019-20 season. Recommendations on the priority groups for seasonal influenza vaccination are summarised below:

(a) Pregnant Women: Pregnant women are recommended to have the highest priority for vaccination. Seasonal influenza vaccination is recommended for all pregnant women for benefits in terms of reduced acute respiratory infection for both mothers and infants, and reduction of cardiopulmonary complications and the associated hospitalisations in pregnant women. IIV is considered to be safe by the WHO for use at any gestational age of

[*****] The UK recommends that vaccination with LAIV should be deferred in children with a history of **active wheezing in the past 72 hours** or **those who have increased their use of bronchodilators in the previous 72 hours**. If their condition has not improved after a further 72 hours then these children should be offered an IIV. Canada recommends that individuals with **severe asthma or those with medically attended wheezing in the 7 days prior to vaccination** should not use LAIV.

pregnancy and there is no evidence indicating that IIV is teratogenic even when given during the first trimester. However, LAIV should ***not*** be used in pregnant women.

(b) Elderly Persons Living in Residential Care Homes: Seasonal influenza vaccination is recommended for elderly persons living in residential care homes for reducing the risk of complications from influenza including hospitalisation and pneumonia in influenza outbreaks.

(c) Long-stay Residents of Institutions for Persons with Disability: Seasonal influenza vaccination is recommended for long-stay residents of institutions for the mentally and physically disabled for reducing influenza related hospitalisation during influenza outbreaks. The disability of the residents hinders them from undertaking adequate hygiene measures in an institutional environment which favours the transmission of influenza.

(d) Persons Aged 50 Years or Above: Seasonal influenza vaccination is recommended for elderly persons aged 65 years or above because of their high risk of complications and excess hospital admissions and death from influenza. Persons aged 50-64 years are also recommended for influenza vaccination because local influenza epidemiology showed that people aged 50–64 years, irrespective of chronic medical problems, were having a higher risk of influenza-related ICU admission and death during seasons predominated by influenza A (H1N1)pdm09.

(e) Persons with Chronic Medical Problems: Seasonal influenza vaccination is recommended for persons aged six months or above having chronic cardiovascular (except hypertension without complication), lung, metabolic or kidney disease, obesity (body mass index 30 or above)†††††, who are immunocompromised‡‡‡‡‡, children and adolescents (aged six months to 18 years) on long-term aspirin therapy, and those with chronic neurological condition that can compromise respiratory function or the handling of respiratory secretions or that can increase the risk for

†††††Obesity is considered as an independent risk factor for influenza complication and thus people with body mass index of ≥30 are included for seasonal influenza vaccination.
‡‡‡‡‡People who are immunocompromised refer to those with a weakened immune system due to disease (such as HIV/AIDS) or treatment (such as cancer treatment).

aspiration or those who lack the ability to take care for themselves. Seasonal influenza vaccination is recommended in view of their increased risk of complications and death associated with influenza infection. Of note, LAIV should not be used in immunocompromised persons.

(f) Health Care Workers: Seasonal influenza vaccination is recommended for health care workers to reduce morbidity and hence reduce absenteeism related to respiratory infections. It is also recommended in order to reduce the risk of transmitting influenza to patients who are at high risk of complications and mortality from influenza.

(g) Children Aged Six Months to 11 Years: Seasonal influenza vaccination is recommended for children six months to 11 years for reducing influenza related complications such as excess hospitalisations or deaths. Studies in overseas have shown that vaccinating young school children may potentially reduce school absenteeism and influenza transmission in the community.

(h) Poultry Workers: Seasonal influenza vaccination is recommended for poultry workers and persons involved in slaughtering of animals potentially infected with highly pathogenic avian influenza virus for minimising the risk of re-assortment and eventual emergence of a novel influenza virus with pandemic potential through preventing concomitant infections by the human influenza and avian influenza viruses in humans.

(i) Pig Farmers and Pig-slaughtering Industry Personnel: Pig farmers and pig-slaughtering industry personnel are recommended to receive SIV to prevent emergence of new influenza A virus in either human or pig hosts.

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