

# Hong Kong's preparedness for influenza pandemic - Prevention and Protection



**Food and Health Bureau**  
The Government of the Hong Kong  
Special Administrative Region

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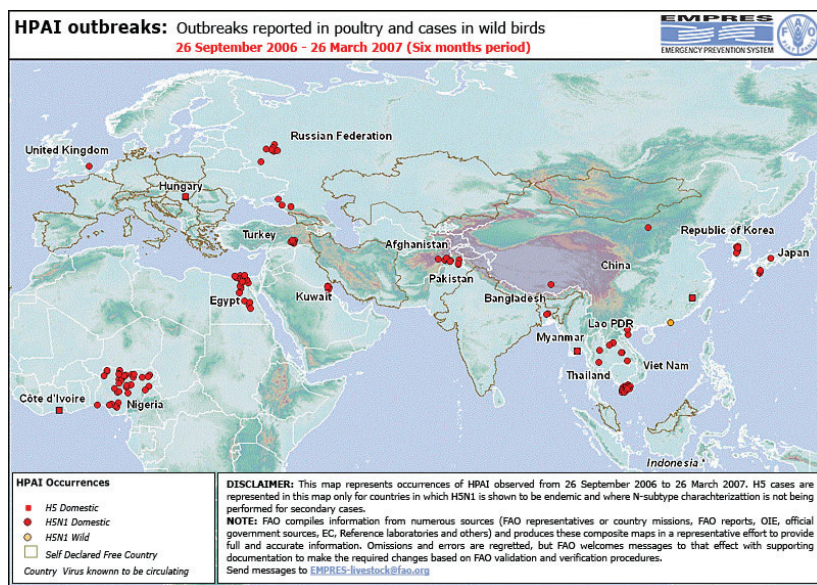
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## **Purpose**

The purpose of this booklet is to provide information for the local and international community on the likelihood of an influenza pandemic, its potential consequences, and the preparedness measures taken by the Hong Kong Special Administrative Region (HKSAR) Government.

# 1. Background

1.1 In human history, influenza pandemics caused by novel virus subtypes led to significant morbidity, mortality and economic loss globally. Three pandemics occurred in the last century – in 1918-19 ('Spanish flu'), 1957-58 ('Asian flu') and 1968-69 ('Hong Kong flu'). The 1918-19 pandemic alone is estimated to have killed between 20 and 40 million people worldwide, a greater toll than that of World War I. Pandemics recur periodically yet unpredictably, and are invariably associated with high morbidity and mortality and great social and economic disruption. For example, during the last pandemic in 1968, 15% of Hong Kong's population were affected. The World Health Organization (WHO) encourages Member States to enhance surveillance and preparedness to cover all novel influenza strains.



Cumulative avian influenza map showing "H5N1" outbreak in poultry and birds from September 2006 to March 2007.



*Migratory birds probably act as carriers for the transport of avian influenza virus over long distances.*

**1.2** Over the past decade, outbreaks of avian influenza infection among poultry have been reported worldwide, particularly in neighbouring countries. While authorities have attempted to curb the spread of the disease by culling poultry, human avian influenza infection by Influenza A (H5), Influenza A (H7) and Influenza A (H9) viruses has occurred, with increasing frequency during recent years. Some outbreaks, such as the H7N7 outbreak which affected more than 80 people in the Netherlands, were large in size. Moreover, avian influenza infection in humans can be severe and life threatening - 30% to 70% of patients infected with H5 died, and a fatality due to H7 has been documented.

**1.3** Highly pathogenic avian influenza is a threat to public health because it may evolve into an efficient and dangerous human pathogen. It is well recognised that influenza viruses have the propensity to change very readily, therefore the emergence of new influenza strains that affect humans is possible. WHO has expressed concern that the avian influenza virus may re-assort its genes with those from a human influenza virus, thereby acquiring the ability to move easily from human to human and thus triggering a pandemic.

## 2. The disease

### 2.1 *Information about Influenza Pandemic*

2.1.1 An influenza pandemic is a global outbreak of disease that occurs when a new influenza virus appears or "re-emerges" in the human population against which the human has no immunity, spreads and causes disease worldwide.

2.1.2 In contrast to seasonal outbreaks which are caused by subtypes of influenza viruses already in existence among people, pandemic outbreaks are caused by new subtypes or by subtypes that have not circulated among people for a long time and to which the majority of the human population lack immunity.

2.1.3 Pandemics spread to all parts of the world very quickly, usually in less than a year. They tend to recur in second and sometimes third waves, and may cause more severe diseases in subsequent waves. The behaviour of pandemics has been unpredictable. Great variations were seen in mortality, severity of disease and patterns of spread in the previous pandemics.

2.1.4 The novel virus has the capacity to cause severe disease in non-traditional age groups (namely young adults). The epidemiological potential of a virus tends to unfold in waves - age groups and geographical areas not affected initially are likely to become vulnerable during the second wave. Over the centuries, most pandemics have originated in parts of Asia where dense populations of people live in close proximity to ducks and pigs. Surveillance for both animal influenza and clusters of unusual respiratory diseases in humans therefore serves an important early warning function.

2.1.5 One consistent feature observed in previous pandemics was the rapid surge in the number of cases over a very brief time resulting in a sudden sharp increase in the need for medical care. Planning to maintain integrity of the health care systems is especially crucial.

2.1.6 Influenza pandemics are different from other threats in that the pandemic will last much longer than most other emergency events and it may include "waves" of influenza activities months apart. The number of health care workers and first responders available to work can be expected to be reduced due to illness. Resources in many locations could be limited depending on how widespread an influenza pandemic would be.

## 2.2 *Emergence of pandemic influenza virus*

2.2.1 According to WHO, the pre-requisites for the start of a pandemic include:

- emergence of a novel virus subtype to which the general population has little or no immunity;
- the new virus must be able to replicate in humans and cause serious illness; and
- the new virus must be efficiently transmitted from one human to another.

2.2.2 Pandemic viruses can emerge through two principal mechanisms: one is by exchange of some genetic materials between two different viruses when they incidentally co-infect the same host; another is by step-wise mutational changes in the virus during sequential infection of humans or other mammals, whereby an avian influenza virus gradually acquires the changes needed to improve its transmissibility among humans.

## 2.3 *Influenza A viruses*

2.3.1 Influenza viruses are grouped into three types: Influenza A, B and C. Type C viruses are stable while types A and B viruses are prone to mutation. Influenza A viruses mutate much more rapidly than type B viruses. Influenza A viruses have a large number of subtypes. The subtypes differ based on the proteins on the surface of the virus. There are only three known subtypes of human influenza viruses currently circulating (H1N1, H1N2 and H3N2). All subtypes of Influenza A viruses can be found in birds which provide a huge pool of genetic diversity.



## 2.4 *Avian influenza infection in humans*

2.4.1 Avian influenza viruses do not normally infect species other than birds. The first documented infection of humans with an avian influenza virus occurred in Hong Kong in 1997 when the H5N1 strain infected 18 people, resulting in six deaths; and in February, 2003, two imported cases were detected, one of which resulted in death. The infection of humans in 1997 coincided with an epidemic of highly pathogenic avian influenza caused by the same strain in Hong Kong's poultry population. Another outbreak of Influenza A (H9N2) occurred in 1999 with two people affected; one case in 2003, and one case in 2007. Reports of H9 affected people have also been published in Guangdong, China (1999). Apart from H5N1 and H9N2, another avian influenza virus (H7N7) has also caused illnesses in humans.

2.4.2 H5N1 is of particular concern for several reasons:

- although of avian origin, H5N1 has a recognised ability to pass directly from birds to human;
- once in humans, H5N1 may cause severe disease with very high mortality;
- prior to the occurrence of human cases of avian influenza (in HKSAR in 1997), pigs were thought to be the obligatory "mixing vessel" for re-assortment of viruses. The findings that humans could be directly infected with purely avian influenza virus (H5N1) and thus may serve as the "mixing vessel" for the exchange of virus genes added significance to the pandemic potential of H5N1; and
- H5N1 virus can infect animals other than birds and pigs, e.g. cats and larger felines, and transmission of infection from other animals to human may occur unknowingly.

### 3. Government infrastructure on public health

3.1 The Food and Health Bureau (FHB) is the policy bureau responsible for policy formulation on matters related to health, food and environmental hygiene. There are four government departments and one public organisation under the FHB.



3.2 The Department of Health (DH) is the Government's health adviser and agency to execute health care policies and statutory functions. It plays a major role in safeguarding public health through provision of various prevention and curative services, partnership with other sectors in the community and collaboration with international health agencies and authorities. The Centre for Health Protection (CHP) was set up in June, 2004, under DH to strengthen Hong Kong's public health system against communicable diseases and other public health hazards. An important objective of CHP is to facilitate emergency preparedness and management of public health crisis.

3.3 The Hospital Authority (HA) is a statutory body established under the Hospital Authority Ordinance to manage all public hospitals in Hong Kong. It is an independent organisation accountable to the Government through the Secretary for

Food and Health who is responsible for the formulation of health policies and monitoring of the performance of the HA.

**3.4** The Agriculture, Fisheries and Conservation Department (AFCD) provides services to the public in connection with agriculture and fisheries, nature conservation and animal, plant and fisheries regulation. In the area of safeguarding public health, it is responsible for animal and plant quarantine, controlling of animal and plant diseases including zoonotic diseases, regulation and inspection of livestock farms, testing diseases and chemical residues in food animals, as well as control of veterinary drug use in livestock farms.

**3.5** The Food and Environmental Hygiene Department (FEHD) is responsible for the implementation of policies to ensure food safety and maintaining a high standard of environmental hygiene in Hong Kong. It plays its part in safeguarding public health through its food surveillance programme to ensure that food available is fit for human consumption, prevention of vector-borne diseases, regulatory control of licensed food premises, provision of quality public cleaning services, education of the public on the importance of food safety and keeping Hong Kong clean, as well as liaison with the relevant Mainland and international authorities.

## 4. Government policy

4.1 The HKSAR Government is committed to safeguarding the health of the community. Our effort in controlling the 1997 avian influenza outbreak has been commended by international experts in having averted a possible impending pandemic. The Government adopts five strategic principles of pandemic preparedness, to safeguard the health of the community:

- Reduce risk of human infections;
- Early detection of pandemic influenza;
- Enhance emergency preparedness and response for pandemic influenza;
- Foster collaboration with the Mainland and international health authorities; and
- Rehabilitation support in post-pandemic phase.

## 5. Legal basis for disease control

5.1 Locally, the Director of Health is responsible for the enactment of a total of 23 pieces of health legislation, including the Quarantine and Prevention of Disease Ordinance (Cap. 141). Doctors are required by law to report 31 notifiable infectious diseases under Cap 141. Avian influenza infection by H5, H7 and H9 has been included. This forms the legal basis whereby officers acting on behalf of the Director of Health can implement public health measures in relation to avian influenza (e.g. isolation). DH is updating and enhancing current legislative framework for prevention and control of infectious diseases.

5.2 At the international level, the revised International Health Regulations (IHR) is a legally binding instrument with the purpose of preventing, protecting against, controlling and providing a public health response to the international spread of disease while avoiding unnecessary interference with international traffic and trade. The regulations provide common reference points and an agreed code of conduct that co-ordinate international responses to global health threats and prevent spread of infectious diseases across borders.

## 6. Preparedness measures

6.1 To effectively execute the emergency preparedness functions, the Government adopts a multi-sectoral and multi-disciplinary approach to gear up support from various disciplines, government departments, health service providers, academic sector and other sectors of the community including health professionals and the public. This ensures a wide spectrum of expertise is available and co-ordinated to meet the challenge.

### 6.2 *Reduce risk of human infection*

- 6.2.1 To reduce the risk of infection spreading from poultry to humans, the Government adopts the following measures:
- (a) vaccination for chickens in local farms and imported chickens;
  - (b) regulation of local farms including tightened biosecurity measures (for example, all farms should be bird-proof);





- (c) import control (for instance, imported chickens must come from registered farms with health certificates);
- (d) segregation policy (no waterfowl which are natural carriers of avian influenza viruses can be sold in retail outlets);
- (e) market rest days to break the virus cycle and reduce the viral load;







- (f) hygiene requirements on wholesale market and retail outlets; and
- (g) surveillance targeted at humans, poultry and wild birds to ensure timely detection of the presence of any avian influenza viruses in our environment.

6.2.2 To reduce the risk of healthcare-associated infections (HAI), a comprehensive infection control infrastructure has been set up. Each major public hospital has an infection control team to oversee infection control policies and practices. Surveillance systems on HAI are being standardised jointly by CHP and HA, with audits being regularly conducted to improve practices. Infection control and prevention programmes are integrated with clinical practices. Infection control training programmes are being provided by CHP and HA to build capacity in the health field, as well as those in community sectors and government departments. Guidelines on infection control are issued for different institutional settings and professional groups. HA has more than 1,400 isolation beds and a new infectious disease block in the Princess Margaret Hospital was completed in 2007.



*Influenza vaccination for poultry workers.*

**6.2.3** The Public Health Laboratory Centre (PHLC) is an accredited centre of WHO for influenza. To reduce the risk of inadvertent introduction of novel influenza virus from the laboratories, biosafety guidelines have been developed and training provided to laboratory staff. The PHLC has formed a network with laboratories of the public hospitals and universities to foster mutual support and research.

## **6.3 Early detection of pandemic influenza**

**6.3.1** Hong Kong has established one of the most comprehensive disease surveillance systems in the region:

- statutory notification;
- sentinel surveillance in general outpatient clinics, private medical practitioners, elderly homes and child care centres;
- laboratory surveillance;
- hospital surveillance (e.g. on HAI, antimicrobial resistance);
- institutional outbreak notifications; and
- media monitoring.



Such surveillance systems provide early warning in preparing for and instituting prompt interventions.

6.3.2 Medical practitioners have been given clear instructions and reporting criteria to report any suspected avian influenza cases. All suspected avian influenza cases are subject to laboratory testing. The regional situation is being closely monitored and there are established channels of communications between Hong Kong, WHO and countries affected by avian influenza.

6.3.3 The surveillance systems are integrated and complementary to one another. An upsurge in disease activities in sentinel surveillance can be verified by change in hospital admission rates. By comparing disease activity in different settings, we can define high risk groups as well as monitor the scale and progression of the epidemic. DH has provided guidelines/protocols, as well as surveillance training to personnel involved.

6.3.4 Web-based reporting has been developed to facilitate reporting of medical practitioners. An eFLU system will be activated to transfer clinical data from HA to DH for avian/pandemic flu cases.

## 6.4 Enhance emergency preparedness and response

### Contingency planning

6.4.1 The Government issued the Preparedness Plan for Influenza Pandemic in early 2005 to enhance government and community preparedness to cope with avian/pandemic influenza emergencies. The plan highlights the key public health action areas under three response levels: Alert, Serious and Emergency. The Government's plan adopts a population-based multi-disciplinary and cross-sectoral approach. It has taken into account the instrumental roles to be played by various government departments and public agencies responsible for public health, law and order, social welfare, education and transportation, etc.



*Pamphlets on Government's Preparedness Plan for Influenza Pandemic are printed for territory-wide distribution.*

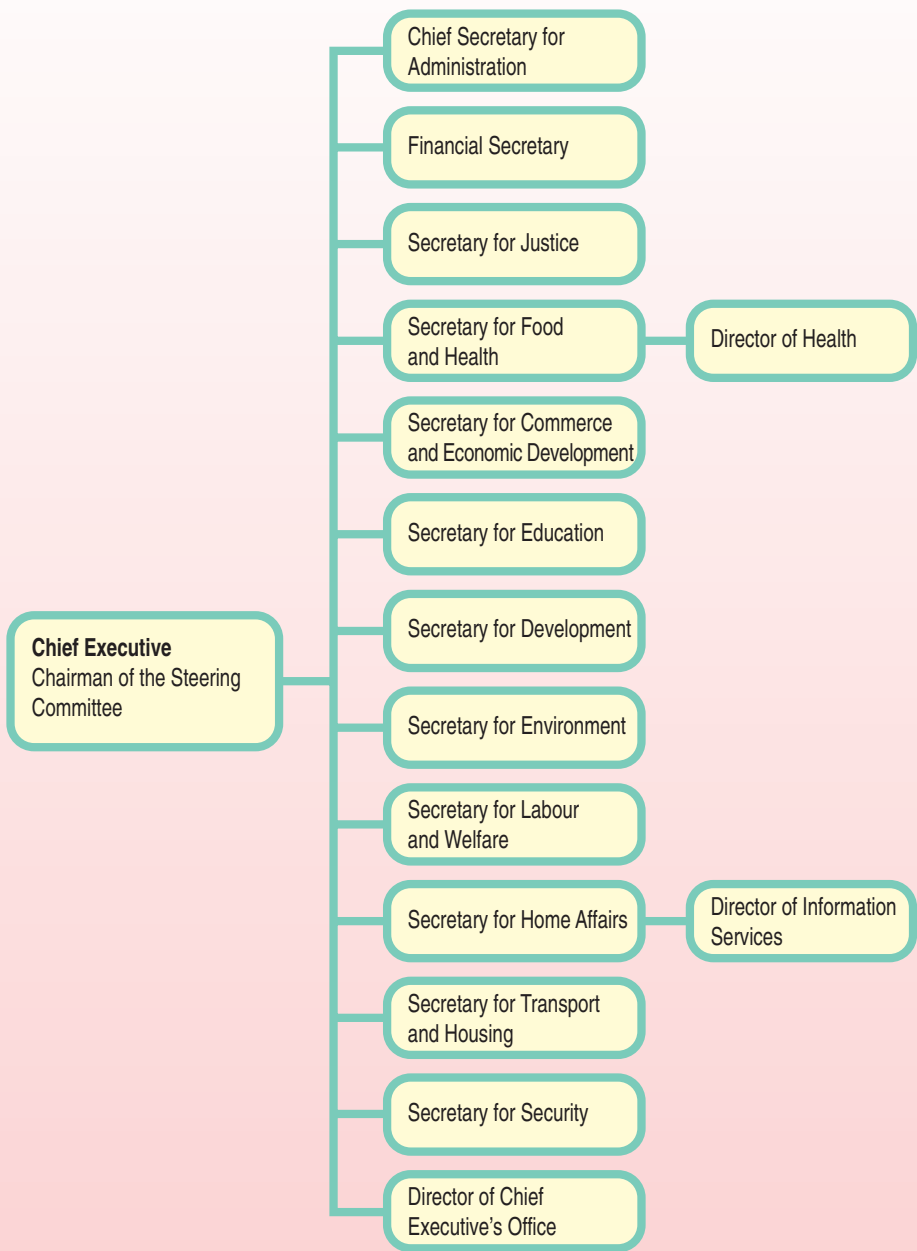
### Command and control structure

6.4.2 The three-tiered response levels also provide an escalated clear command and control structure under the leadership of the HKSAR Government. Different public health objectives have to be fulfilled based on an epidemiological-based risk scenarios in contingency planning (please refer to the following table).

# The three-tiered response levels for Influenza Pandemic

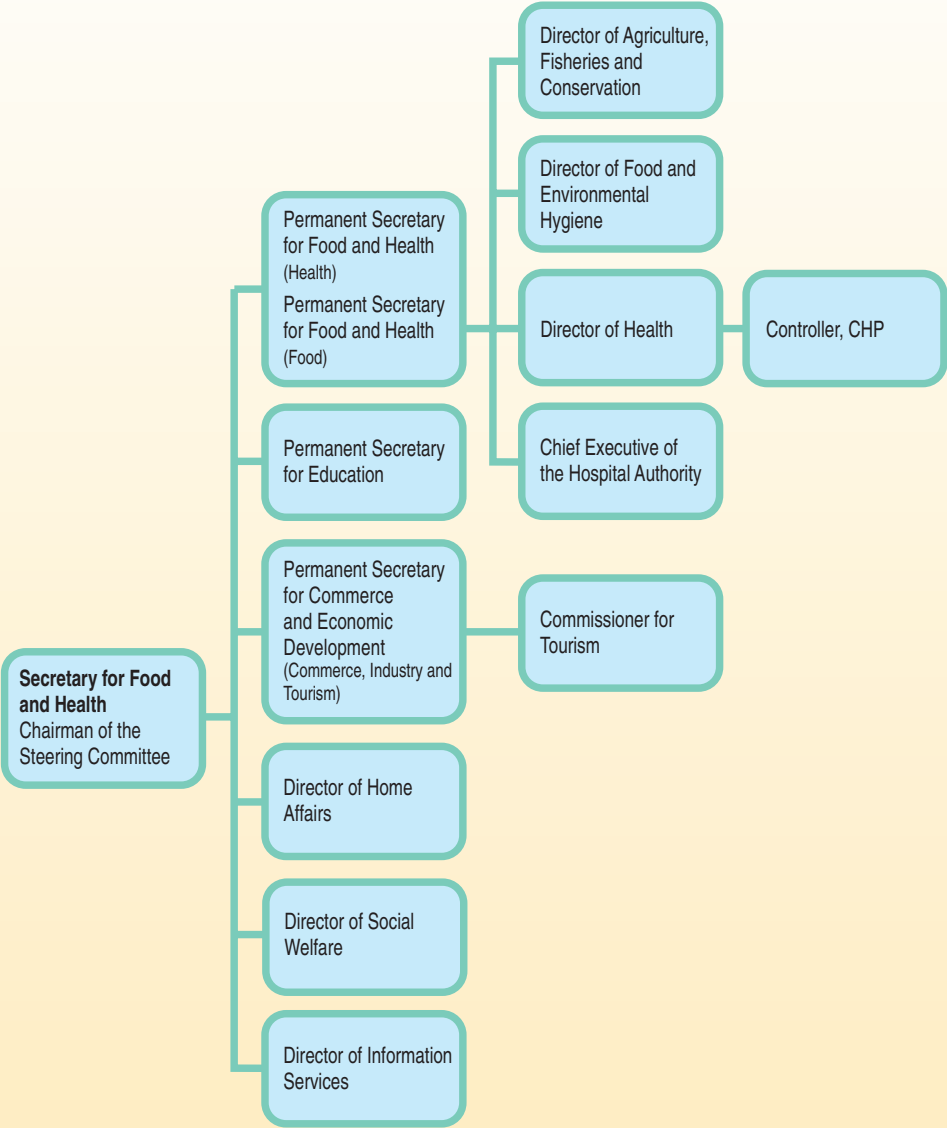
Response Level	Public health objectives	Command & control structure
Alert	Obtain timely and accurate information from other places with a view to preventing introduction of the disease into Hong Kong and to detect local cases as early as possible.	The Food and Health Bureau (FHB), Department of Health (DH), Hospital Authority (HA), Agriculture, Fisheries and Conservation Department (AFCD) and the Food and Environmental Hygiene Department (FEHD) are the main parties assessing the nature and level of risks.
Serious	Contain the disease as soon as possible, identify foci of infection, prevent local transmission and exportation of disease to other places.	<ul style="list-style-type: none"> <li>Steering Committee chaired by Secretary for Food and Health (SFH) will be set up to steer Government response.</li> <li>The Steering Committee will be chaired by the Chief Executive.</li> <li>The Steering Committee will have as its core members the Permanent Secretary for Food and Health (Health) (PS(Health)), Permanent Secretary for Food and Health (Food) (PS(Food)), Permanent Secretary for Education, Permanent Secretary for Commerce and Economic Development (Commerce, Industry and Tourism), Director of Agriculture, Fisheries and Conservation, Director of Food and Environmental Hygiene, Director of Health (DoH), Controller, Centre for Health Protection (Controller, CHP), Director of Information Services (DIS), Director of Social Welfare, Commissioner for Tourism and Chief Executive of the Hospital Authority. The committee will co-opt other senior officials and non-Government experts as circumstances warrant.</li> </ul>
Emergency	<ul style="list-style-type: none"> <li>Early phase: contain the disease as soon as possible, identify foci of infection, prevent large outbreak from occurring, interrupt and stop chain of local transmission and prevent exportation of disease to other places.</li> <li>Late phase: slow down progression of the epidemic and minimise loss of human lives in order to buy time for the production of an effective vaccine against the novel pandemic influenza strain.</li> </ul>	<ul style="list-style-type: none"> <li>The Steering Committee will be chaired by the Chief Executive.</li> <li>The Steering Committee will have the Chief Secretary for Administration, the Financial Secretary, the Secretary for Justice, SFH, the Secretary for Commerce and Economic Development, the Secretary for Education, the Secretary for Development, the Secretary for Home Affairs, the Secretary for Transport and Housing, the Secretary for Environment, the Secretary for Labour and Welfare, the Secretary for Security, Director of Chief Executive's Office, DoH and DIS as its members; and will co-opt other senior officials and non-Government experts as circumstances warrant.</li> </ul>

# Command Structure for Response to Influenza Pandemic during Emergency Response Level



*The committee would co-opt other senior officials and non-Government experts as circumstances warrant.*

# Command Structure for Response to Influenza Pandemic during Serious Response Level



*The committee would co-opt other senior officials and non-Government experts as circumstances warrant.*

## *Stockpiling of drugs and personal protective equipment (PPE)*

6.4.3 Recognising the need for infection control, treatment and prophylaxis to minimise the impact of a pandemic, antiviral drugs and PPE are being stockpiled. The antiviral stockpiling strategies are based on the recommendations of Scientific Committee on Emerging and Zoonotic Diseases.



## *Surge capacity building*

6.4.4 To prepare for large-scale outbreaks overwhelming the public health care system, staff and hospital bed mobilisation plans have been prepared. DH works closely with private doctors associations, pharmacists associations, nursing associations and non-governmental organisations to draw up volunteer lists for assistance in public health or clinical services during emergencies (e.g. influenza pandemics). Training in infection control and epidemiology is being offered to health care workers, government workers, private sectors and so forth to prepare them.

## Drills and Exercises

6.4.5 The effectiveness of inter-departmental co-ordination and response can be tested only through real-life scenario-based drills and exercises. Inter-departmental drills and exercises have been/will be conducted on a regular basis for testing the Government's preparedness plans on infectious diseases outbreaks.



*An inter-departmental exercise, code-named MAPLE, was conducted on 18-19 November 2004 to review the Government's preparedness in case of an outbreak of an unknown communicable disease in Hong Kong.*

## Enhance port health measures

6.4.6 Temperature screening is performed at the Airport to show our commitment to preventing disease importation or exportation, for public reassurance, and to tie in with the port health education targeted at travellers. The enhanced port health measures include:

- (a) distribute health information leaflets at airline counters for passengers going to affected areas;
- (b) broadcast health messages on all in-bound flights from affected areas;





- (c) temperature screening at Airport for in-bound travellers;
- (d) inform potential travellers via Travel Health Service Website the progress of the avian influenza in affected areas; and
- (e) alert the travel industry about latest avian flu situation in affected areas and provide relevant health advice.

### **Contingent outbreak response**

6.4.7 Once disease outbreaks are detected through the notification and surveillance systems, the authorities concerned will carry out immediate epidemiological investigations, implement necessary quarantine and isolation measures, conduct case finding, contact tracing and environmental surveys, and investigate the source of outbreak. Immediate control measures, which include eradicating the source or reservoir (e.g. depopulation of chickens in avian influenza outbreak), quarantine (e.g. home confinement of close/household contacts) and medical surveillance will be instituted as appropriate. Depending on the mode of transmission, infectivity, incubation and infectious period and scale of outbreak, social distancing measures, such as



closure of schools, cancellation of large public gatherings may need to be instituted to minimise the contact rates and human mobility.

### *Emergency response co-ordination*

6.4.8 An Emergency Response Centre (ERC) has been set up to serve as the nerve centre of DH for dealing with public health emergencies. During major outbreaks of infectious diseases, the ERC will be activated to help disseminate timely and consistent information to facilitate formulation of strategies in combating infectious diseases.

### *IT as a tool for health protection*

6.4.9 During the SARS outbreak, DH and HA set up databases, which were hooked up with the Police Major Incident Investigation and Disaster Support System (MIIDSS). MIIDSS is mainly used to track down criminals, but in that case the villain was a virus. During large outbreaks of infectious disease, this system can be used to co-ordinate mass contact tracing and to map out potentially infected buildings. Such timely identification, followed by swift isolation if necessary, is crucial to controlling the outbreak. Hong Kong would continue to leverage on IT to enhance the capability for effective control of infectious disease outbreaks. The next milestone in the pipeline includes a new Communicable Disease Information System, or CDIS in short, which will facilitate more systematic sharing of disease surveillance information between the CHP, HA, other healthcare providers and non-healthcare institutions.

## *World-class research*

6.4.10 Moreover, Hong Kong has a pool of world-class researchers who run the first and only State Key Laboratory of Emerging Infectious Diseases in its field located outside the Mainland. They will back us up in our battle against emerging infectious diseases. As part of China, Hong Kong is also ready to assist other economies with avian influenza investigations in terms of epidemiological and laboratory support.

## *Provision of essential medical services*

6.4.11 On the clinical side, designated clinics for triaging patients with influenza-like illness at primary care level will be set up. Confirmed cases will be treated and isolated in designated hospitals. Discussions with private hospitals on patients transfer/diversion and sharing of clinical workload have been initiated.

## *Responsive risk communication*

6.4.12 On risk communication, DH has regularly conveyed messages of pandemic influenza prevention using a variety of means including TV, radio, internet, outreach programmes, seminars etc. In response to emerging threats in neighbouring areas, we have put much emphasis on promoting travel health among the tourism industry and tourists.



*Public forums on preparedness for influenza pandemic have been held to provide health advice to the public.*



TV APIs on prevention of avian influenza.

Grand Award, 'Best of Public Service Announcements' Questar Awards 2005, New York.



Designated webpage on influenza providing information on prevention of avian influenza/pandemic influenza.

## 6.5 Foster collaboration with the Mainland and international health authorities

6.5.1 Early warnings of emerging infections come not only locally, but may originate from neighbouring places. There is regular exchange of information on infectious diseases between Hong Kong and our neighbouring Guangdong Province and Macao. The three places undertake to notify each other of any infectious disease epidemics of public health significance. A similar framework has been set up with the Mainland's Ministry of Health. Such intense cross-border disease surveillance effectively alerts Hong Kong, and the rest of the world.



*The Secretary for Food and Health, Dr York Chow, signed a new Co-operation Arrangement with the Minister of the State General Administration of Quality Supervision, Inspection and Quarantine, Mr Li Changjiang, in Beijing on 20 October 2005; to further enhance the exchange and co-operation between the two authorities on food safety, inspection and quarantine of live animals and plants as well as hygiene inspection. Picture shows Dr Chow (left) shaking hands with Mr Li after the signing ceremony.*



*The Fifth Tripartite Meeting of Guangdong-Hong Kong-Macao Expert Group on Prevention and Control of Infectious Diseases was held in Macao on 13 and 14 July 2005. Picture shows the press conference held after the meeting.*

## 6.6 *Rehabilitation support in post-pandemic period*

6.6.1 While the next pandemic may be unavoidable, the provision of timely support and assistance to the needy victims and their families has an essential role to play in our overall plan to deal with a major infectious disease outbreak. The Social Welfare Department and HA would endeavour to provide rehabilitation and psychological support to recovering patients and families of deceased patients.

6.6.2 An effective mechanism is incorporated in our social security system through which community resources and private donations can be channelled to help these victims promptly during and after the outbreak.



## 7. Useful links

1. Prevention of Avian Influenza:  
<http://www.info.gov.hk/info/flu/eng/index.htm>
2. Department of Health: <http://www.dh.gov.hk>
3. Centre for Health Protection: <http://www.chp.gov.hk/>
4. Hospital Authority: <http://www.ha.org.hk/>
5. World Health Organization: <http://www.who.int/>
6. The Centres for Disease Control and Prevention:  
<http://www.cdc.gov/>



*Information kits on preparedness for influenza pandemic.*

