

CDAlert

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Special Issue: Human Swine Influenza: a pandemic threat

INTRODUCTION

Influenza (Flu) pandemics are caused by new influenza viruses that have recently adapted to humans and resemble major natural disasters both in terms of recurrence and magnitude. The influenza virus, known to be circulating as a pathogen in the human population since at least the 16th century, is notable for its unique ability to cause recurrent epidemics and global pandemics. Genetic reassortments in the influenza virus cause fast and unpredictable antigenic changes in important immune targets leading to recurrent epidemics of febrile respiratory disease every 1 to 3 years, consistently necessitated the development of new vaccines. Each century has seen some pandemics rapidly progressing to all parts of the world due to emergence of a novel virus to which the overall population holds no immunity.

SWINE FLU IN PIGS

Swine Influenza (swine flu) is a respiratory disease of pigs caused by type A influenza virus that regularly causes outbreaks of influenza in pigs. Swine flu viruses cause high levels of illness and low death rates in pigs. Swine influenza viruses usually circulate among swine throughout the year, but most outbreaks occur during the late fall and winter months similar to outbreaks in humans. The classical swine flu virus (an influenza type A H1N1 virus) was first isolated from a pig in 1930. H3N2 influenza viruses began circulating among pigs from 1998. The H3N2 viruses initially were introduced into the pig population from humans.

Like all influenza viruses, swine flu viruses change constantly. Pigs can be infected by avian influenza viruses, human influenza viruses as well as swine influenza viruses and hence the pigs are known to be a mixing vessel. When influenza viruses from different species infect pigs, the viruses can re-assort (i.e.

swap genes) and new viruses, a mix of swine, human and/or avian influenza viruses - can emerge leading to development of new novel strain for which human beings do not have immunity. There are four main influenza type A virus subtypes that have been isolated in pigs: H1N1, H1N2, H3N1 and H3N2. However, most of the recently isolated influenza viruses from pigs have been H1N1 viruses.

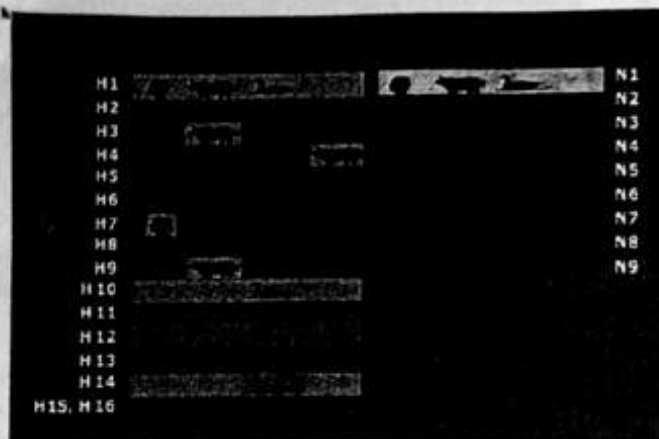
Swine flu virus spreads mostly through close contact among pigs and possibly from contaminated objects moving between infected and uninfected pigs. Symptoms of swine flu in pigs can include sudden onset of fever, depression, coughing (barking), discharge from the nose or eyes, sneezing, breathing difficulties, eye redness or inflammation, and going off feed.

SWINE FLU IN HUMANS

Swine flu viruses do not normally infect humans. However, sporadic human infections with swine flu have occurred. Most commonly, these cases occur in persons having direct exposure to pigs. In addition, there have been sporadic cases of one person spreading swine flu to others. Occasional human swine influenza virus infection occurs every one to two years in the U.S., but from December 2005 through February 2009, 12 cases of human infection with swine influenza have been reported.

SWINE FLU OUTBREAK

Recently, human cases of swine influenza A (H1N1) virus infection have been reported in several countries. This is a novel influenza A virus that has not been identified in people before, and human-to-human transmission of the virus appears to be ongoing and thus represents a real pandemic threat. WHO has upgraded the phasing of pandemic influenza from Phase -3 to Phase - 5.



The above diagram shows various subtypes of Influenza A virus which infects humans, swine, birds, poultry and horses and other animals, but wild birds are the natural hosts for these viruses. Influenza type A viruses are divided into subtypes and named on the basis of two proteins on the surface of the virus: hemagglutinin (HA) and neuraminidase (NA). There are 16 known HA subtypes and 9 known NA subtypes. Many different combinations of HA and NA proteins are possible. For example, an "H1N1" virus has an HA 1 protein and an NA 1 protein. Only some influenza A subtypes (i.e., H1N1, H1N2, and H3N2) are currently in general circulation among people. Other subtypes are found most commonly in other animal species.

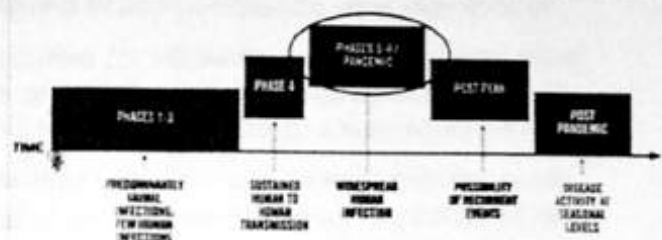
Current Situation: The current situation regarding the outbreak of swine influenza A(H1N1) is evolving rapidly. As on 29th April 2009, nine countries have officially reported 148 confirmed cases of swine influenza A/H1N1 infection. Of these, United States has reported 91 laboratory confirmed human cases, including one death. Mexico has reported 26 confirmed human cases including seven deaths.

The following countries have reported laboratory confirmed cases with no deaths - Austria (1), Canada (13), Germany (3), Israel (2), New Zealand (3), Spain (4) and the United Kingdom (5). All these cases have history of travel to Mexico.

Unlike the experience in Mexico, the United States is currently reporting infection by the identical virus strain or less severe clinical spectrum of disease. Mexican health officials have reported several hundred suspect cases, including several deaths associated with swine influenza A (H1N1) virus infection. In Mexico, many patients have experienced rapidly progressive pneumonia, respiratory failure and acute respiratory distress syndrome (ARDS) requiring mechanical ventilation.

WHO PHASES OF PANDEMIC ALERT (Source: WHO)

PANDEMIC INFLUENZA PHASES



Phase 1	No animal influenza virus circulating among animals has been reported to cause infections in humans.
Phase 2	An animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans, and is therefore considered a specific potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.
Phase 4	Human-to-human transmission (H2H) of an animal or human-animal influenza reassortant virus able to sustain "community-level outbreaks has been verified.
Phase 5	The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.
Phase 6	The pandemic phase , is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5 .
Post Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels
Possible new wave	Level of pandemic influenza activity in most countries with adequate surveillance rising again
Post Pandemic Period	Levels of Influenza activity have returned to levels seen for seasonal influenza in most countries with adequate surveillance.

The current WHO phase of pandemic alert is 5. WHO has declared the outbreak as **PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN (PHEIC)**

(Source: WHO: Pandemic influenza preparedness and response)

INFLUENZA SURVEILLANCE

Surveillance is the foundation of all efforts to understand and control influenza. The monitoring of influenza disease patterns is essential for identification of high risk groups, planning of prevention and response activities for complications and for estimating the burden of disease in terms of health and economic impact.

It is important to use standardized case definitions that enable comparisons between different areas within a country and also between countries. There are two case definitions used by the influenza surveillance system:

1. **Influenza-like illness (ILI)** is defined (according to WHO criteria) as:

- Sudden onset of a fever over 38°C, AND
- Cough or sore throat, AND
- An absence of other diagnoses.

2. **Severe Acute Respiratory Infections (SARI):**

For persons ≥ 5 years, the definition for SARI is adapted from the WHO protocol on rapid response:

- Sudden onset of fever over 38°C, AND
- Cough or sore throat, AND
- Shortness of breath or difficulty in breathing, AND
- Requiring hospital admission

For children < 5 years old: definition is adapted from the program for Integrated Management of Childhood Illness (IMCI):

Any child < 5 years old clinically suspected of having Pneumonia or Severe/very Severe Pneumonia and requiring hospital admission.

Confirmed case of influenza is defined as any case with laboratory test results positive for influenza virus.

CASE DEFINITION OF SWINE FLU IN HUMANS

A **suspected case** of swine influenza A (H1N1) virus infection is defined as a person with acute febrile respiratory illness (fever $\geq 38^\circ\text{C}$) with onset

- within 7 days of close contact with a person who is a confirmed case of swine influenza A (H1N1) virus infection, or
- within 7 days of travel to areas where there are one or more confirmed swine influenza A(H1N1) cases, or
- resides in a community where there are one or more confirmed swine influenza cases.

A **probable case** of swine influenza A (H1N1) virus infection is defined as a person with an acute febrile respiratory illness who:

- is positive for influenza A, but unsubtypable for H1 and H3 by influenza RT-PCR or reagents used to detect seasonal influenza virus infection, or
- is positive for influenza A by an influenza rapid test or an influenza immunofluorescence assay (IFA) plus meets criteria for a suspected case, or
- individual with a clinically compatible illness who died of an unexplained acute respiratory illness who is considered to be epidemiologically linked to a probable or confirmed case.

A **confirmed case** of swine influenza A (H1N1) virus infection is defined as a person with an acute febrile respiratory illness with laboratory confirmed swine influenza A (H1N1) virus infection at WHO approved laboratories by one or more of the following tests:

- Real Time PCR
- Viral culture
- Four-fold rise in swine influenza A (H1N1) virus specific neutralizing antibodies.

OTHER DEFINITIONS

Close contact is defined within 6 feet of an ill person who is a confirmed, probable or suspected case of swine influenza A (H1N1) virus infection during the infectious period.

Acute respiratory illness is defined as illness of recent onset with atleast two of the following: rhinorrhea or nasal congestion, sore throat, cough (with or without fever).

High-risk group for complications of influenza is defined as a person such as:

- resident of institutions for elderly people and the disabled;
- people with certain chronic health conditions (chronic heart or lung disease, metabolic or renal disease or immunodeficiencies);
- elderly people and very young children.

Infectious period: The infectious period for a confirmed case of swine influenza A (H1N1) virus infection is defined as 1 day prior to the onset of illness to 7 days after onset.

TRANSMISSION

- Influenza viruses can be directly transmitted from pigs to people and from people to pigs.
- Human infection with flu viruses from pigs are most likely to occur when people are in close proximity to infected pigs, such as in pig barns and livestock exhibits housing pigs at fairs.

- Human-to-human transmission of swine flu can also occur. This is thought to occur in the same way as seasonal flu which is mainly person-to-person transmission through coughing or sneezing by people infected with the influenza virus.
- Disease spreads very quickly among the population especially in crowded places.
- Cold and dry weather enables the virus to survive longer outside the body than in other conditions and, as a consequence, seasonal epidemics in temperate areas appear in winter.
- People may become infected by touching/handling something contaminated with flu viruses on it and then touching their mouth or nose.
- Swine influenza viruses are not transmitted by food.
- Eating properly handled and cooked pork (at an internal temperature of $\geq 160^{\circ}\text{F}$) and pork products is safe.

SYMPTOMS

The symptoms of swine flu in people are expected to be similar to the symptoms of regular human seasonal influenza like **fever, lethargy, lack of appetite and cough**. Some people have also reported **runny nose, sore throat, nausea, vomiting and diarrhoea**.

DIAGNOSIS OF SWINE FLU

For diagnosis of swine influenza A infection, respiratory specimen would generally need to be collected within the first 4 to 5 days of illness (when an infected person is most likely to be shedding virus). However, some persons, especially children, may shed virus for 10 days or longer.

Sample Collection & Laboratory Diagnosis

- **Sample Collection and handling** is same as for human avian flu or seasonal influenza like illness (Refer CD Alert on AI).
- **Sample Collection:** should be done by the treating doctor who is managing the case.
- **Preferred respiratory samples** : nasopharyngeal swab and throat swab.
- **Storage of Samples:** all samples should be kept at $2-8^{\circ}\text{C}$ until they can be placed at -70°C .
- **Transportation of Samples:** Clinical samples should be transported on dry ice in triple packaging. All samples should be labeled clearly and include patient's complete information and should be sent to NIV, Pune or NICD, Delhi within 24 hours for further investigations.
- **Laboratory biosafety measures** should be followed for collection, storage, packaging and shipping of influenza samples.

Available Laboratory tests:

- Rapid Antigen Tests: not as sensitive as other available tests.
- RT-PCR
- Virus isolation
- Virus Genome Sequencing
- Four-fold rise in swine influenza A (H1N1) virus specific neutralizing antibodies.

It is important to note that samples from all cases, once the Pandemic starts, are not required to be tested.

Important Contact Numbers:

Outbreak Monitoring Cell (Control Room, NICD): 011-23921401

EMR Control room (Ministry of Health and Family Welfare: 011- 23061469

Important Websites:

www.mohfw.nic.in; www.nicd.nic.in

PREVENTIVE MEASURES

There is currently no vaccine available against human swine influenza. One has to follow proper hand hygiene and respiratory etiquettes.

Do's and Don'ts:

- Avoid close contact with people who are having respiratory illness.
- Sick persons should keep distance from others.
- If possible, stay at home, away from work, school, and public places when you are sick.
- Cover your mouth and nose with a tissue or handkerchief when coughing or sneezing.
- If you have no tissue or handkerchief, you should not clean the nose with the hands but with the cuff of your shirt or clothes.
- Washing your hands often with soap or alcohol based hand wash will help protect from germs.
- Get plenty of sleep, be physically active, manage your stress, drink plenty of fluids, and eat nutritious food.
- Persons who develop influenza-like-illness (ILI) (fever with either cough or sore throat) should be strongly encouraged to self-isolate in their home for 7 days after the onset of illness or at least 24 hours after symptoms have resolved, whichever is longer.
- Persons who experience ILI and wish to seek medical care should contact their health care providers to report illness (by telephone or other remote means) before seeking care at a clinic, physician's office, or hospital.
- Persons who have difficulty breathing or shortness of breath should seek immediate

medical attention and report to the nearby hospital.

- If ill persons must go into the community (e.g., to seek medical care) they should wear a face mask to reduce the risk of spreading the virus in the community.
- If a face mask is unavailable, ill persons needing to go into the community should use a handkerchief or tissues to cover any coughing and sneezing.
- Persons in home isolation and their household members should be given infection control instructions like frequent hand washing with soap and water; use of alcohol-based hand gels (containing at least 60% alcohol).
- When the ill person is within 6 feet of others at home, the ill person should wear a face mask, if available or handkerchief or tissues.
- **Household contacts** who are well should:
 - remain home at the earliest sign of illness;
 - minimize contact in the community to the extent possible;
 - designate a single household family member as the ill person's caregiver to minimize interactions with asymptomatic persons.
- **Precautions for School children:**
 - Schools with a confirmed or a suspected case should be considered for closure.
 - All school or childcare related gatherings should be cancelled and encourage parents and students to avoid congregating outside of the school.
 - Schools and childcare facilities should bar students for a time period to be evaluated on an ongoing basis depending upon epidemiological findings.
 - Schools and childcare facilities should consult with their local or state health departments for guidance on reopening. If no additional confirmed or suspected cases are identified among students (or school-based personnel) for a period of 7 days, schools may consider reopening.
 - Schools and childcare facilities in unaffected areas should begin to prepare for the possibility of school or childcare facility closure.
- **Social Distancing Interventions:**
 - Large gatherings linked to settings or institutions with laboratory-confirmed cases should be cancelled, for example a school event linked to a school with cases; other large gatherings in the community may need to be cancelled at this time.
 - Additional social distancing measures are currently not recommended.

- Persons with underlying medical conditions who are at high risk for complications of influenza may avoid large gatherings.

SWINE INFLUENZA A (H1N1) VIRUS: BIOSAFETY GUIDELINES FOR LABORATORY WORKERS

Laboratory workers who may be processing or performing diagnostic testing on clinical specimens from patients with suspected swine influenza A (H1N1) virus infection, or performing viral isolation.

Diagnostic laboratory work on clinical samples from patients who are suspected cases of swine influenza A (H1N1) virus infection should be conducted in a BSL2 laboratory. All sample manipulations should be done inside a biosafety cabinet.

Viral isolation on clinical specimens from patients who are suspected cases of swine influenza A (H1N1) virus infection should be performed in a BSL2 laboratory with BSL3 practices (enhanced BSL2 conditions).

Additional precautions include:

- Recommended Personal Protective Equipment (based on site specific risk assessment)
- Respiratory protection – fit-tested N95 respirator or higher level of protection.
- Shoe covers
- Closed-front gown
- Double gloves
- Eye protection (goggles or face shields)
- Appropriate disinfectants
 - 70% Ethanol
 - 5% Lysol
 - 10% Bleach

All personnel should self monitor for fever and other symptoms of Swine influenza. Any illness should be reported to the supervisor immediately.

For personnel who had unprotected exposure or a known breach in personal protective equipment to clinical material or live virus from a confirmed case of swine influenza A (H1N1), **antiviral chemoprophylaxis** with oseltamivir for 7 days after exposure can be considered.

Waste disposal

All waste disposal procedures should be followed as outlined in the respective facility standard laboratory operating procedures.

ANTIVIRAL TREATMENT

Oseltamivir is the recommended drug both for prophylaxis and treatment.

Supportive therapy includes:

- IV Fluids.
- Parenteral nutrition.
- Oxygen therapy/ ventilatory support.
- Antibiotics for secondary infection.
- Vasopressors for shock.
- Paracetamol or ibuprofen is prescribed for fever, myalgia and headache. Patient is advised to drink plenty of fluids. Smokers should avoid smoking. For sore throat, short course of topical decongestants, saline nasal drops, throat lozenges and steam inhalation may be beneficial.
- Salicylate / aspirin is strictly contra-indicated in any influenza patient due to its potential to cause Reye's syndrome.

The **suspected cases** would be constantly monitored for clinical / radiological evidence of lower respiratory tract infection and for hypoxia (respiratory rate, oxygen saturation, level of consciousness).

Adult patients should be discharged 7 days after symptoms have subsided.

Children should be discharged 14 days after symptoms have subsided.

The family of patients discharged earlier should be educated on personal hygiene and infection control measures at home; children should not attend school during this period.

ANTIVIRAL CHEMOPROPHYLAXIS

Prophylaxis is given to:

- All close contacts of suspected, probable and confirmed cases. Close contacts include household /social contacts, workplace or school contacts, fellow travelers etc.
- All health care personnel coming in contact with suspected, probable or confirmed cases
- **Oseltamivir** is the drug of choice. (Tamil)
- Prophylaxis should be provided till 10 days after last exposure (maximum period of 6 weeks)
- By Weight:

> For weight <15kg:	30 mg OD
> 15-23kg:	45 mg OD
> 24-40kg:	60 mg OD
> ≥ 40kg:	75 mg OD
- For infants:

> <3 months: not recommended unless situation judged critical due to limited data on use in this age group	
> 3-5 months:	20 mg OD
> 6-11 months:	25 mg OD

- **Close Contacts** of suspected, probable or confirmed cases should be advised to remain at home (voluntary home quarantine) for days after the last contact with the case. Monitoring of fever should be done for at least 7 days. Prompt testing and hospitalization must be done when symptoms are reported.

All suspected cases, clusters of ILI/SARI cases need to be notified to the State Health Authorities and the Ministry of Health & Family Welfare, Govt. of India (Director, EMR and Director, NICD)

FREQUENTLY ASKED QUESTIONS

What is swine flu?

Swine Influenza (swine flu) is a respiratory disease of pigs caused by type A influenza viruses that causes regular outbreaks in pigs. People do not normally get swine flu, but human infections can and do happen. Swine flu viruses have been reported to spread from person-to-person, but in the past, this transmission was limited and not sustained beyond three people.

Are there human infections with swine flu in India?

In late March and early April 2009, cases of human infection with swine influenza A (H1N1) viruses were first reported in Southern California and near San Antonio, Texas. Other U.S. states have reported cases of swine flu infection in humans and cases have been reported internationally as well. Central & State Health Authorities are monitoring the situation in India. So far, no case has been reported.

Is this swine flu virus contagious?

CDC has determined that this swine influenza A (H1N1) virus is contagious and is spreading from human to human. However, at this time, it is not known how easily the virus spreads between people and between countries.

What are the signs and symptoms of swine flu in people?

The symptoms of swine flu in people are similar to the symptoms of regular human flu and include fever, cough, sore throat, body aches, headache, chills and fatigue. Some people have reported diarrhea and vomiting associated with swine flu. In the past, severe illness (pneumonia and respiratory failure) and deaths have been reported with swine flu infection in people. Like seasonal flu, swine flu may cause a worsening of underlying chronic medical conditions.

How does swine flu spread?

Spread of swine influenza A (H1N1) virus is thought to be happening in the same way as that of seasonal flu. Flu viruses are spread mainly from person to person through coughing or sneezing of people with

influenza. Sometimes people may become infected by touching something with flu viruses on it and then touching their mouth or nose.

How can someone with the flu infect someone else?

Infected people may be able to infect others beginning 1 day before symptoms develop and up to 7 or more days after becoming sick.

What should I do to keep from getting the flu?

First and most important: wash your hands frequently. Try to stay in good general health. Get plenty of sleep, be physically active, manage your stress, drink plenty of fluids, and eat nutritious food. Avoid touching surfaces that may be contaminated with the flu virus. Avoid close contact with people having respiratory illness.

Are there medicines to treat swine flu?

Yes. The use of oseltamivir for the treatment and/or prevention of infection with these swine influenza viruses is recommended. Antiviral drugs fight against the flu by keeping flu viruses from reproducing in your body. If you get sick, antiviral drugs can make your illness milder and make you feel better faster. They may also prevent serious flu complications. For treatment, antiviral drugs work best if started soon after getting sick (within 2 days of symptoms). They are currently available with hospitals and are to be administered under supervision of clinicians.

How long can an infected person spread swine flu to others?

People with swine influenza virus infection should be considered potentially contagious as long as they are symptomatic and possibly for up to 7 days following onset of illness. Children, especially younger children, might potentially be contagious for longer periods.

What surfaces are most likely to be sources of contamination?

Germs can be spread when a person touches something that is contaminated with germs and then touches his or her eyes, nose, or mouth. Droplets from a cough or sneeze of an infected person move through the air.

How long can viruses live outside the body?

We know that some viruses and bacteria can live 2 hours or longer on surfaces like cafeteria tables, doorknobs, and desks. Frequent hand washing will help you reduce the chance of getting contamination from these common surfaces.

What can I do to protect myself from getting sick?

Currently available seasonal influenza vaccine does not protect against swine flu. There are everyday actions that can help prevent the spread of germs that cause respiratory illnesses like influenza. Take these everyday steps to protect your health:

- Cover your nose and mouth with a tissue when

you cough or sneeze. Throw the tissue in the trash after you use it.

- Wash your hands often with soap and water, especially after you cough or sneeze. Alcohol-based hand cleaners are also effective.
- Avoid touching your eyes, nose or mouth. Germs spread this way.
- Try to avoid close contact with people having respiratory illness.
- If one gets sick with influenza, one must stay at home, away from work or school and limit contact with others to keep from infecting them. However, if one is having any respiratory distress, one should report to a nearby hospital.

What should I do if I get sick?

If you live in areas where swine influenza cases have been identified and become ill with influenza-like symptoms e.g. fever, body aches, runny nose, sore throat, nausea, or vomiting or diarrhea, you may contact your health care provider, particularly if you are worried about your symptoms. Your health care provider will determine whether influenza testing or treatment is needed.

If you are sick, you should stay home and avoid contact with other people as much as possible to keep from spreading your illness to others. If you become ill and experience any of the following warning signs, seek emergency medical care.

In children emergency warning signs that need urgent medical attention include:

- Fast breathing or trouble breathing
- Bluish skin color
- Not drinking enough fluids/eating food
- Not waking up or not interacting
- Being so irritable that the child does not want to be held
- Flu-like symptoms improve but then return with fever and worse cough
- Fever with a rash

In adults, emergency warning signs that need urgent medical attention include:

- Difficulty breathing or shortness of breath
- Pain or pressure in the chest or abdomen
- Sudden dizziness
- Confusion
- Severe or persistent vomiting

Can I get swine influenza from eating or preparing pork?

No, swine influenza viruses are not spread by food. Eating properly handled and cooked pork products is safe.

SUMMARY TABLE OF RECOMMENDED ACTIONS

PREPAREDNESS COMPONENTS	PHASES				
	1-3	4	5-6	POST PEAK	POST PANDEMIC
PLANNING AND COORDINATION	<i>Develop, exercise, and periodically revise national influenza pandemic preparedness and response plans.</i>	<i>Direct and coordinate rapid pandemic containment activities in collaboration with WHO to limit or delay the spread of infection.</i>	<i>Provide leadership and coordination to multisectoral resources to mitigate the societal and economic impacts.</i>	<i>Plan and coordinate for additional resources and capacities during possible future waves.</i>	<i>Review lessons learned and share experiences with the international community. Replenish resources.</i>
SITUATION MONITORING AND ASSESSMENT	<i>Develop robust national surveillance systems in collaboration with national animal health authorities, and other relevant sectors.</i>	<i>Increase surveillance. Monitor containment operations. Share findings with WHO and the international community.</i>	<i>Actively monitor and assess the evolving pandemic and its impacts and mitigation measures.</i>	<i>Continue surveillance to detect subsequent waves.</i>	<i>Evaluate the pandemic characteristics and situation monitoring and assessment tools for the next pandemic and other public health emergencies.</i>
COMMUNICATIONS	<i>Complete communications planning and initiate communications activities to communicate real and potential risks.</i>	<i>Promote and communicate recommended interventions to prevent and reduce population and individual risk.</i>	<i>Continue providing updates to general public and all stakeholders on the state of pandemic and measures to mitigate risk.</i>	<i>Regularly update the public and other stakeholders on any changes to the status of the pandemic.</i>	<i>Publicly acknowledge contributions of all communities and sectors and communicate the lessons learned; incorporate lessons learned into communications activities and planning for the next major public health crisis.</i>
REDUCING THE SPREAD OF DISEASE	<i>Promote beneficial behaviours in individuals for self protection. Plan for use of pharmaceuticals and vaccines.</i>	<i>Implement rapid pandemic containment operations and other activities; collaborate with WHO and the international community as necessary.</i>	<i>Implement individual, societal, and pharmaceutical measures.</i>	<i>Evaluate the effectiveness of the measures used to update guidelines, protocols, and algorithms.</i>	<i>Conduct a thorough evaluation of all interventions implemented.</i>
CONTINUITY OF HEALTH CARE PROVISION	<i>Prepare the health system to scale up.</i>	<i>Activate contingency plans.</i>	<i>Implement contingency plans for health systems at all levels.</i>	<i>Rest, restock resources, revise plans, and rebuild essential services.</i>	<i>Evaluate the response of the health system to the pandemic and share the lessons learned.</i>

(Source: WHO: Pandemic influenza preparedness and response)

...about CDAIert

CDAIert is a monthly newsletter of the National Institute of Communicable Diseases (NICD), Directorate General of Health Services, to disseminate information on various aspects of communicable diseases to medical fraternity and health administrators. The newsletter may be reproduced, in part or whole, for educational purposes.

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