# CD Alert

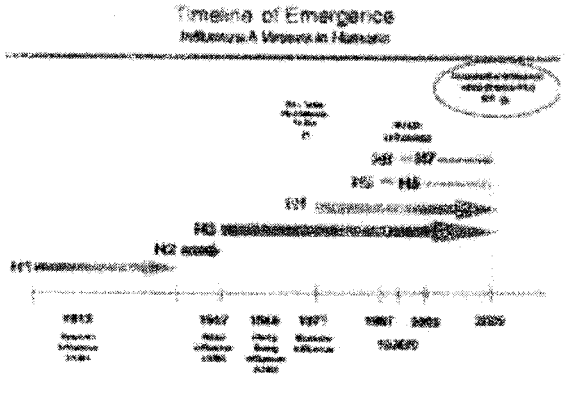
# PANDEMIC INFLUENZA A (H1N1) 2009 (UPDATE JANUARY 2015)

## INTRODUCTION

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 re-assortments 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.

In 2009, Pandemic Influenza A (H1N1) was the most common circulating strain of influenza virus globally. It first caused illness in Mexico and the United States in March and April, 2009 and continued to spread globally with more than 214 countries worldwide reporting laboratory confirmed cases and over 18449 deaths reported to WHO as on 1st August 2010.

It is thought that pandemic influenza (H1N1) 2009 spreads in the same way that regular seasonal influenza viruses spread, mainly through the coughs and sneezes of people who are sick with the virus, but it may also be spread by touching infected objects and then touching nose or mouth. Pandemic (H1N1) 2009 infection has been reported to cause a wide range of flu-like symptoms, including fever, cough, sore throat, body aches, headache, chills and fatigue. In addition, many people also have reported nausea, vomiting and/or diarrhea.




Past Pandemics

1918 pandemic in humans:- The 1918 flu pandemic in humans was associated with Influenza A (H1N1). An estimated one third of the world's population (or H~500 million persons) was infected and had clinically apparent illnesses during the 1918–1919 influenza pandemic. The disease was exceptionally severe. Case-fatality rates were >2.5%, compared to <0.1% in other influenza pandemics. Total deaths were estimated at H ~ 50 million and were arguably as high as 100 million.

Swine influenza was first proposed to be a disease related to human influenza during the 1918 flu pandemic, when pigs became sick at the same time as humans. Although it is not certain in which direction the virus was transferred, some evidence suggests that, in this case, pigs caught the disease from humans. The first identification of an influenza virus as a cause of disease in pigs occurred about ten years later, in 1930. For the following 60 years, swine influenza strains were almost exclusively H1N1. These strains included genes derived due to reassortment from human, swine and avian viruses. The H1N1 form of swine flu is one of the descendants of the strain that caused the 1918 flu pandemic.

1957: "Asian Flu": The pandemic occurred due to Influenza A (H2N2) and caused 1-2 million deaths worldwide.

1968: "Hong Kong Flu": This pandemic was associated with Influenza A (H3N2) and 700,000 deaths were reported worldwide.

2009 : "Pandemic Influenza A H1N1" : The H1N1 viral strain implicated in the 2009 flu pandemic among humans was earlier referred to as "swine flu" because initial testing showed many of the genes in the virus were similar to influenza viruses normally occurring in North American swine. But further research has shown that the outbreak is due to a reassortant strain of H1N1 not previously reported in pigs.

In late April 2009, World Health Organization, declared a "Public Health Emergency of International Concern" under the rules of the WHO's new International Health Regulations when the first cases of the H1N1 virus were

reported in the United States. On 11 June 2009 WHO declared pandemic phase 6 in response to the spread of new influenza A (H1N1) virus.

However In 2010, the pandemic virus started behaving more like a seasonal influenza virus .In that summer, outbreaks due to pandemic H1N1 were not seen ,it was co-circulating with seasonal A(H3N2) and B viruses, and the intensity of transmission was lower than in 2009. For these reasons, the World Health Organization (WHO) downgraded its pandemic alert from phase 6 to the post-pandemic phase on 10 August 2010.

## EPIDEMIOLOGY

**Pre-requisites to start Influenza Pandemics**

(i) Emergence of a novel virus to which all are susceptible
(ii) New virus is able to replicate and cause disease in humans
iii) New virus is transmitted efficiently from human-to-human.

**Pandemic Influenza A (H1N1) Virus:** The 2009 pandemic A H1N1 virus appeared to be of swine origin and contained a unique combination of gene segments that had not been identified in the past. The molecular analysis of the novel H1N1 virus had re-assorted segments from American swine, Eurasian swine, Avian and Human virus. It had not been previously detected in pigs or humans. It showed sensitivity to oseltamivir, but was resistant to both amantadine and rimantadine.

**About the Virus:** It is an enveloped RNA virus and belongs to the family orthomyxoviridae. The size of the virus is 80-200 nm /.08 -0.12 micron in diameter. There are three types of influenza A virus, namely A, B & C. The virus contains two surface antigens H (hemagluttinin) and N (neuraminidase).

**Person-to-person transmission** - Influenza virus is present in respiratory secretions of infected persons. As a result, influenza virus can be transmitted through droplets by sneezing.

**Incubation period** - Although the precise incubation period has not been established for pandemic H1N1 influenza A infection, it could range from one to seven days, and most likely from one to four days.

| Phase | Total lab confirmed cases (Cumulative ) | Death of lab confirmed cases (Cumulative ) |
|---|---|---|
| May-2009 to Dec 2010 (including Pandemic | 47,840 | 2744 |
| Jan 2011 to 30th Dec 2014 (Post Pandemic) | 11,234 | 1322 |

The first case in India was reported on 15th May 2009 from Hyderabad

First death in India was reported on 6th July 2009 from Pune

## SURVIVAL OF THE INFLUENZA VIRUS

The Pandemic H1N1 influenza virus can survive on different items for different periods. The virus can survive on hard and nonporous surfaces for 24-48 Hours. On plastic & stainless steel, it is recoverable upto 24 hours and can be transferred to hands up to 24 hours. On cloth, paper and tissue, the virus is recoverable for 8-12 hours and transferable to hands up to 15 minutes. The virus can survive at humidity of 35-40% and a temperature of 280C (820 F).

## CLINICAL MANIFESTATIONS

The clinical presentations of the H1N1 influenza A pandemic are fever, cough, sore throat, malaise, and headache; vomiting and diarrhoea.

**Children** - Young children are less likely to have the usual influenza signs and symptoms such as fever and cough. Infants may present with fever and lethargy, and may not have cough or other respiratory symptoms. Symptoms of severe disease in infants and young children may include apnoea, tachypnoea, dyspnoea, cyanosis, dehydration, altered mental status, and extreme irritability.

**High Risk Groups**- These risk groups include:

- Children younger than 5 years old;
- Adults 65 years of age and older;
- Chronic pulmonary condition (including asthma), cardiovascular (except hypertension), renal, hepatic, hematological (including sickle cell disease), neurologic, neuromuscular, or metabolic disorders (including diabetes mellitus);
- Immunosuppression, including that caused by medications or by HIV;
- Pregnant women;
- Residents of nursing homes and other chronic-care facilities;
- Obesity.

## CASE DEFINITION OF PANDEMIC INFLUENZA IN HUMANS

**A suspected case** of the Pandemic Influenza A H1N1 virus infection is defined as a person with acute febrile respiratory illness (reported or documented fever, and one of the following: cough, sore throat, shortness of breath, difficulty in breathing or chest pains) with onset

within 7 days of close contact with a person who is a probable or confirmed case of the new influenza A (H1N1) virus infection, or

within 7 days of travel to a community internationally where there has been one or more confirmed Pandemic influenza A (H1N1) cases, or

resides in a community where there are one or more confirmed new influenza cases

**A Probable case** of Pandemic Influenza A (H1N1) 2009 virus infection is defined as an individual with an influenza test that is positive for influenza A, but is unsubtypable by reagents used to detect seasonal influenza virus infection;

OR

An individual with a clinically compatible illness or 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 Pandemic Influenza A (H1N1) virus infection is defined as an individual with laboratory confirmed new influenza A (H1N1) virus infection by one or more of the following:

- real-time RT-PCR,
- viral culture
- four-fold rise in new influenza A(H1N1) virus-specific neutralizing antibodies.

### Treatment/ Chemoprophylaxis of Influenza A H1N1

Table 1. Recommended Treatment Dosage of Oseltamivir

| Body Weight (kg) | Body Weight (lbs) | Age (years) | Dose for 5Days | # Bottles of Oral Suspension Needed for the 5 Day Regimen | # of Capsules Needed for the 5 Day Regimen |
|---|---|---|---|---|---|
| ≤15 | ≤ 33 | 1-2 | 30 mg twice daily | 1 | 10 capsules (30 mg) |
| > 15-23 | > 33-51 | 3-5 | 45 mg twice daily | 2 | 10 capsules (45 mg) |
| > 23-40 | > 51-88 | 6-9 | 60 mg twice daily | 2 | 20 capsules (30 mg) |
| > 40 | > 88 | 10-12 | 75 mg twice daily | 3 | 10 capsules (75 mg) |

| Body Weight (kg) | Dose by Age | Recommended Treatment Dose for 5 Days (Dose in volume is based on the concentration (12 mg/mL) of commercially manufactured Oseltamivir Oral Suspension) |
|---|---|---|
| Dosing for infants younger than 1 year not based on weight | < 3 months | 12 mg (1 mL) twice daily |
| | 3-5 months | 20 mg (1.6 mL) twice daily |
| | 6-11 months | 25 mg (2 mL) twice daily |

### Recommended Prophylaxis Dosage of Oseltamivir

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| Dosing for infants younger than 1 year not based on weight | < 3 months | Not recommended unless situation judged critical |
| | 3-5 months | 20 mg (1.6 mL) once daily |
| | 6-11 months | 25 mg (2 mL) once daily |

## OSELTAMIVIR / ZANAMIVIR

Treatment with oseltamivir or zanamivir is recommended for all people with suspected or confirmed influenza who require hospitalization. Treatment with zanamivir or oseltamivir should be initiated as soon as possible after the onset of symptoms. Benefits from antiviral treatment are maximal when treatment is started within 48 hours of illness onset. The recommended duration of treatment is five days. However, hospitalized patients with severe infection might require longer treatment course.

## CONTAINMENT STRATEGIES OF MOHFW (GOI) DURING 2009 H1N1 PANDEMIC

- Early detection, investigation and containment of cases of influenza A H1N1
- Training and equipping manpower to investigate and contain number of cases
- Strengthening of health care infrastructure
- Stockpiling of antiviral drugs, PPE, N-95 and triple layer mask & Oseltamivir
- Preparation of guidelines and standard operating procedures (SOPs) and IEC material
- Management of cases
- Increasing Awareness
- Lab Network for Influenza A H1N1 Surveillance
  - 22 under Government sector
  - 21 under private sector
- Contact Tracing
- Drug Resistance Monitoring
- Enhanced Surveillance.

## GUIDELINES FOR SAMPLE COLLECTION AND HANDLING OF HUMAN CLINICAL SAMPLES FOR LABORATORY DIAGNOSIS OF H1N1

Whom to test — Testing for pandemic H1N1 influenza A should be considered in individuals with an acute febrile respiratory illness (a measured temperature of 100°F or higher and recent onset of at least one of the following: rhinorrhea, nasal congestion, sore throat, or cough).

**Priority for testing should be given to:**

- Those who require hospitalization and
- Those who are at high risk for severe complications

To establish the diagnosis of pandemic H1N1 influenza A, an upper respiratory sample (nasopharyngeal swab, nasal swab, throat swab, combined oropharyngeal/ nasopharyngeal swab, or nasal aspirate) should be collected. In intubated patients, an endotracheal aspirate should also be obtained.

Specimens should be placed in viral transport media and placed on ice (4°C) or refrigerated immediately for transportation to the laboratory. Once the samples arrive in the laboratory, they should be stored either in a refrigerator at 4°C or in a -70°C freezer. If a -70°C freezer is not available, they should be kept refrigerated, preferably for ≤1 week.

**When to Collect Respiratory Specimens?**

Sample should be collected as soon as possible after symptoms begin, before antiviral medications are administered. Multiple specimens on multiple days could be collected if you have access to patient.

**General Biosafety Measures**

All biosafety measures should be followed and samples should be taken only after wearing full compliment of PPE. After collection of samples, PPE should be disposed off as waste properly as per guidelines.

## RECOMMENDED TESTS

The recommended test to confirm the diagnosis of pandemic H1N1 influenza A virus is real-time reverse transcriptase (RT-PCR) in designated laboratories. The laboratory has to have BSL2 facility and one needs to follow BSL3 precautions while performing tests.

Virus isolation should be carried out only by those laboratories which have BSL3 facility.

## GUIDELINES FOR GENERAL PUBLIC SCREENING CENTRES AND ISOLATION FACILITIES IN HOSPITALS

**Advisory for General Public**

1. Avoid over crowded places
2. Keep a distance of one meter from the person who is coughing
3. Cover your mouth and nose while coughing and sneezing
4. Wash your hands with soap and water regularly
5. Home quarantine advise to children if having cough /cold

All hospitals identified to screen and admit patients with influenza H1N1 should conform to these guidelines. Identified hospitals would have a separate screening area to screen outdoor patients and an isolation facility to admit those requiring indoor treatment. For clarity, these guidelines are in six parts:
(i) Generic Guidelines (ii) Guidelines for pre hospital care (iii) Guidelines for the screening center (iv) Guidelines for isolation facility and (v) Guidelines for critical care (vi) Mortuary care.

**(i) Generic guidance**

- Standard Precautions to be followed at all patient care areas: hand hygiene, Gloves and use of personal protective equipment (PPE) to avoid direct contact with patient's blood, body fluids, secretions and non-intact skin, prevention of needle stick/sharp injury and cleaning and disinfection of the environment and equipment.
- Droplet precautions to be followed when caring for patients with influenza A H1N1 (masks, respirators and eye shield) in isolation facilities.
- Airborne and Contact Precautions should complement Standard Precautions while managing case of Pandemic influenza A H1N1 in critical care facilities.
- Hospitals should follow the hospital waste management protocols as per the hospital waste management rules.
- Dead body should be handled using full cover of PPE.

**(ii) Guidelines for Pre Hospital Care**

- All identified hospitals to have advanced life support ambulance.
- Designated paramedic and driver for the ambulance
- The ambulance staff should follow standard precautions while handling the patient and airborne precautions if aerosol generating procedures are done.
- Triple layer surgical masks should be available and worn during transport.
- As far as possible the movements should be restricted.
- During transport, optimize the vehicle's ventilation to increase the volume of air exchange (e.g. opening the windows). When possible, use vehicles that have separate driver and patient compartments.
- Aerosol generating procedures to be avoided to the extent possible.
- Disinfect the ambulance after shifting patient.
- Notify the receiving facility as soon as possible.

**(iii) Guidelines for setting up Screening Centre**

**Purpose of the Screening Centre is to:**

- Attend to patients of influenza like illness in a separate area so as to avoid these patients further infecting other patients in Out Patient Department.

- Facilitate implementing standard and droplet precautions.
- Triage the patients.
- Collect samples.

**The screening area should have:**

- A waiting area of about 2000sq. feet to accommodate 50-100 patients.
- Preferably standalone building with separate entry.
- Well ventilated to ensure frequent air changes. If air-conditioned, then independent from central air conditioning. Exhaust air to be filtered through HEPA filter (desirable).
- Patient's seating to have at least one meter clearance on all sides. Avoid overcrowding of patients.
- Will have cabins for registration, clinical examination chambers, sample collection rooms and drug distribution center.
- The waiting area should be adequately cleaned and disinfected.
- Source control (e.g. use of tissues, handkerchiefs, piece of cloth or triple layer surgical masks to cover nose and mouth) of the patient in the waiting room when coughing or sneezing, and hand hygiene after contact with respiratory secretions.
- Facility for hand wash. / Wash rooms etc.

**(iv) Guidelines for setting up isolation facility/ ward**

- Patients should be housed in single rooms, whenever possible.
- However, if sufficient single rooms are not available, beds could be put with a spatial separation of at least 1 meter (3 feet) from one another.
- To create a 10 bed facility, a minimum space of 2000 sq feet area clearly segregated from other patient-care areas is required.
- There should be double door entry with changing room and nursing station. Enough PPE should be available in the changing room with waste disposal bins to collect used PPEs.
- Place a puncture-proof container for sharps disposal inside the isolation room/area.
- Keep the patient's personal belongings to a minimum. Keep water pitchers and cups, tissue wipes, and all items necessary for attending to personal hygiene within the patient's reach.
- Non-critical patient-care equipment (e.g. stethoscope, thermometer, blood pressure cuff, and sphygmomanometer) should be dedicated to the patient, if possible. Any patient-care equipment that is required for use by other patients should be thoroughly cleaned and disinfected before use.
- Dedicated hand washes and wash room facilities.
- If room is air-conditioned, ensure 12 air changes/ hour and filtering of exhaust air. A negative pressure in isolation rooms is desirable for patients requiring aerosolization procedures (intubation, suction nebulisation). These rooms may have stand alone air-conditioning. These areas should not be a part of the central air-conditioning.
- If air-conditioning is not available negative pressure could also be created through putting up 3-4 exhaust fans driving air out of the room.
- In district hospital, where there is sufficient space, natural ventilation may be followed. Such isolation facility should have large windows on opposite walls of the room allowing a natural unidirectional flow and air changes. The principle of natural ventilation is to allow and enhance the flow of outdoor air by natural forces such as wind and thermal buoyancy forces from one opening to another to achieve the desirable air change per hour.
- Avoid sharing of equipment, but if unavoidable, ensure that reusable equipment is appropriately disinfected between patients.
- Ensure regular cleaning and proper disinfection of common areas, and adequate hand hygiene by patients, visitors and care givers.
- Visitors to the isolation facility should be restricted. For unavoidable entries, they should use PPE according to the hospital guidance, and should be instructed on its proper use and in hand hygiene practices prior to entry into the isolation room/area.
- Doctors, nurses and paramedics posted to isolation facility need to be dedicated and not allowed to work in other patient-care areas.
- Consider having designated portable X-ray equipment.
- Corridors with frequent patient transport should be well-ventilated.
- All health staff involved in patient care should be well trained in the use of PPE.
- A telephone or other method of communication should be set up in the isolation room/area to enable patients or family members/visitors to communicate with nurses.

**(v) Guidelines for Critical Care facility**

- At least one identified hospital may have a 10 bed dedicated intensive care facility at state capital.
- The critical care facility is required to follow all the guidelines as mentioned above for infection control.
- Also more than or equal to 12 air changes and maintain negative pressure of 40 psi.
- Should have dedicated equipments. It should also have additional equipments to ventilate at least 10 patients manually.
- A telephone or other method of communication should be set up in the isolation room/area to enable patients or family members/visitors to communicate with nurses inside the facility.
- Would have an information board outside to update relatives on the clinical status.

**(vi) Mortuary care**

- Mortuary staff should apply standard precautions i.e. perform proper hand hygiene and use appropriate PPE (use of gown, gloves, facial protection if there is a risk of splashes from patient's body fluids/ secretions onto staff's body and face).
- Embalming, if required should be conducted according to usual procedures, subject to local

regulations/legislation.

- Hygienic preparation of the deceased (e.g. cleaning of body, tidying of hair, etc.) also may be done using standard precautions.

## GUIDELINES FOR THE USE OF MASKS

**Types of mask: Specification for Triple Layer Surgical Mask and N-95 Respirator Mask**

| Item | Specification |
|---|---|
| Triple Layer Surgical Mask | Tie on Mask of Non-woven, Hypoallergenic 3 ply construction with filter in between offering >99 percent standard with 4 tie strings |
| N-95 Respirator Mask | Filter efficiency of 95 % or more against particulate aerosols. The mask should be provided with expiration valve. It should be disposable & to be able to fit for wide range of face sizes. It should accompany with certification from NIOSH or any other internationally accepted certification. |

**The correct procedure of wearing triple layer surgical mask:**

Unfold the pleats, make sure that they are facing down.

Place over nose, mouth and chin.

Fit flexible nose piece over nose bridge.

Secure with tie strings (upper string to be tied on top of head above the ears –lower string at the back of the neck).

Ensure there are no gaps on either side of the mask, adjust to fit.

Do not let the mask hanging from the neck.

Change the mask after six hours or as soon as they become wet.

Disposable masks are never to be reused and should be disposed off.

While removing the mask great care must be taken not to touch the potentially infected outer surface of the mask

To remove mask first untie the tie-string below and then the tie string above and handle the mask using the upper strings.

**Disposal of used masks:** Used mask should be considered as potentially infected medical waste:

In the hospital setting it should be disposed off in the identified infectious waste disposal bag/container.

In community settings where medical waste management protocol cannot be practiced, it may be disposed off either by burning or deep burial.

During home care, patients and contacts using triple layer mask should first disinfect used mask with ordinary bleach solution or sodium hypochlorite solution and/or quaternary ammonium household disinfectant and then dispose off either by burning or deep burial.

## MANAGEMENT OF SUSPECTED PATIENTS OF INFLUENZA A H1N1

In order to prevent and contain outbreak of Influenza A H1N1 virus for screening, testing and isolation following guidelines (issued by the Govt. of India) are to be followed:

At first, all individuals seeking consultations for flu like symptoms should be screened at designated healthcare facilities or examined by a doctor and these will be categorized as under:

**Category- A:**

Patients with **mild fever plus cough / sore throat** with or without body ache, headache, diarrhoea and vomiting will be categorized as Category-A. They **do not require** Oseltamivir and should be treated for the symptoms mentioned above. The patients should be monitored for their progress and reassessed at 24 to 48 hours by the doctor.

**No testing of the patient for H1N1 is required.**

Patients should confine themselves at home and avoid mixing up with public and high risk members in the family.

**Category-B:**

In addition to all the signs and symptoms mentioned under Category-A, if the patient has high grade fever and severe sore throat, he/she may require home isolation and Oseltamivir.

In addition to all the signs and symptoms mentioned under Category-A, individuals having one or more of the following high risk conditions shall be treated with Oseltamivir:

Children less than 5 years old;

Pregnant women;

Persons aged 65 years or older;

Patients with lung diseases, heart disease, liver disease, kidney disease, blood disorders, diabetes, neurological disorders, cancer and HIV/ AIDS;

Patients on long term cortisone therapy.

**No tests for H1N1 are required for Category-B (i) and (ii).**

All patients of Category-B (i) and (ii) should confine themselves at home and avoid mixing with public and high risk members in the family.

**Category-C:**

In addition to the above signs and symptoms of Category-A and B, if the patient has one or more of the following:

Breathlessness, chest pain, drowsiness, fall in blood pressure, sputum mixed with blood, bluish discoloration of nails;

Irritability among small children, refusal to accept feed;

Worsening of underlying chronic conditions.

All these patients mentioned above in Category-C require testing, immediate hospitalization and treatment including Oseltamivir.

**Home Care treatment for Influenza A H1N1**

People with novel H1N1 flu, who are cared for at home, should:

Check with their health care provider about any special care they might need if they are pregnant or have a health condition such as diabetes, heart