



International Journal of Medicine and Pharmaceutical Research

Journal Home Page: www.pharmaresearchlibrary.com/ijmpr



Review Article

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Swine Flu: A Major Threat for Dental Health Care Professionals

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ABSTRACT

Swine Flu is causing havoc all over the world with large numbers of people constantly getting affected and where the government is helpless about the situation. However, some directed antivirus drugs like Oseltamivir (Tamiflu) and Zanamivir (Relenza) are available for the cure. These drugs are to be used only when the symptoms are confirmed with swine flu infection. There are various preventing measures available to minimize the spread of swine flu. Hence, we as Dental health care professionals should try to fight the barriers like fear and use necessary precautions to prevent the swine flu (H1N1) infection and that way we can protect ourselves and patients. This review article summarizes types of swine flu, transmission, infectious and incubation period, symptoms, management, prevention of swine flu(H1N1) infection.

Keywords: Swine Flu, Swine Influenza A, H1N1 Virus Infection

ARTICLE INFO

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Article History: Received 08 March 2016, Accepted 12 April 2016, Available Online 10 June 2016

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 Manuscript ID: IJMPR2931



PAPER-QR CODE

Citation Apexa B Patel, et al. Swine Flu: A Major Threat for Health Care Professionals. *Int. J. Med. Pharm. Res.*, 2016, 4(3): 155-160.

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1. Introduction

The recent outbreak of human infection with swine flu or Influenza a (H1N1) virus is spreading rapidly through sustained human-to-human transmission in many countries. Swine influenza A (H1N1) virus infection is caused by any strain of the influenza family of viruses which is common International Journal of Medicine and Pharmaceutical Research

in pigs.¹ It is also called H1N1 flu, swine flu, hog flu, and pig flu. Swine flu was officially declared as the Pandemic in 2009 is a major threat for dental professionals and for all people around the world, with the fatality constantly rising and the number of people being infected constantly.²

(B) Types of swine flu:

From three genres of influenza viruses that cause human flu, two also cause influenza in pigs. As of 2009, the known SIV strains include influenza "C" and the subtypes of influenza "A" known as H1N1, H1N2, H3N1, H3N2, and H2N3. With influenza "A" is being widespread in pigs and influenza "C" being rare³. They are discussed briefly as below:

Influenza A

Swine influenza is known to be caused by influenza "A" of subtypes H1N1, H1N2, H3N1, H3N2, and H2N3⁸. In pigs, three subtypes H1N1, H3N2, and H1N2 are the most common strains worldwide⁹. In the United States, the H1N1 subtype was exclusively prevalent among swine populations before 1998; however, from August 1998, H3N2 subtypes have been isolated from pigs

Influenza C

The virus infects both human and pigs, but does not infect birds⁴. Transmission between pigs and human had occurred previously⁵. For example, influenza "C" caused small outbreaks of a mild form of influenza amongst children in Japan and California⁶. Influenza C does not cause pandemics in humans⁷ as it has limited host range and the lack of genetic diversity.⁸⁻⁹

(C) Transmission:

Swine influenza A (H1N1) is as contagious as the usual human influenza¹⁰. Human-to-human transmission occurs by inhalation of large infectious droplets and droplet nuclei as well as by direct contact with secretions or aerosols.¹¹ Droplet exposure from respiratory secretions after coughing and sneezing can contaminate mucosal surfaces such as nose, mouth, and eyes. Contact, with an infectious patient or fomite (a surface that is contaminated with secretions) and then self inoculation of virus onto mucosal surfaces such as those of the nose, mouth & eyes and Small particle aerosols in the vicinity of the infectious individual.¹² At present, there is no evidence of spread of infection by eating pork, or through water. Judging the pandemic potential of Swine influenza A(H1N1) is difficult as limitation of data available, though recent epidemiological analyses suggest its transmissibility is substantially higher than that of seasonal flu, and comparable with previous influenza pandemics.¹³ Transmission of influenza through the air over long distances, such as from one patient room to another, is not thought to occur. All respiratory secretions and bodily fluids, such as diarrhoeal stools, of patients with H1N1 influenza are considered to be potentially infectious.^{2,14}

(D) Infectious period:

Generally persons with swine influenza virus A (H1N1) infection should be considered potentially infectious for 1-7 days following illness onset or until symptoms resolve. Children, patients with lower respiratory tract infections, elderly and immune compromised patients might be infectious for up to 10 days or longer.^{9,10} This is due to low cytotoxic T lymphocyte activity which is responsible for viral clearance and recovery from infection.¹¹ Cytotoxic T lymphocyte activity declines in the elderly as well as in immune compromised individuals so that viral shedding could persist longer in them.¹² But studies regarding viral

shedding to define the infectious period are needed. The persons with asymptomatic infection to be the source of infection to others is unknown but should be investigated.

(E) Incubation period:

The incubation period for swine influenza A(H1N1) virus infection could range from 1 to 7 days, and most likely from 1 to 4 days¹³ which is longer than that of seasonal human influenza (1—4 days).¹⁵

(F) Symptoms

The most frequently reported symptoms from persons affected with swine influenza A (H1N1) virus infection are listed below:

- Fever > 100.4°F (> 38°C) and
- Cough
- Chills and rigors
- Myalgia and joint pains
- Vomiting
- Diarrhea
- Fatigue
- Stuffy nose
- Sore throat

Mostly swine flu A(H1N1) virus infection is usually mild, but some patient with swine flu had shown serious respiratory illness, including pneumonia, pneumomedia stinum, necrotizing pneumonia, and empyema or respiratory failure leading to death. Patients with chronic medical conditions such as asthma, chronic lung disease, heart disease, diabetes, suppressed immune systems including from chemotherapy and kidney failure are at higher risk for complications from swine flu. And also pregnant women are at high risk for severe disease.^{11,19}



Figure 1: Showing symptoms of swine flu

2. Management**Case detection of swine influenza A (H1N1) virus¹⁹**

The possibility of swine influenza A (H1N1) virus infection should be considered in all patients with severe acute respiratory illness in countries or territories prone to the swine flu.

Suspected case: A person with acute febrile respiratory illness with onset:

Within 7 days of close contact with a person who is a confirmed case of swine influenza virus or Within 7 days of travel to areas where there are one or more confirmed swine influenza virus cases or Resides in a community where there are one or more confirmed swine influenza cases.

Probable case:

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 / Is positive for influenza A by an influenza rapid test or an influenza immune fluorescence assay plus meets criteria for a suspected case / 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.

Confirmed case:

A person with an acute febrile respiratory illness with laboratory-confirmed swine influenza A (H1N1) virus infection by one or more of the following tests:

- Real-time RT-PCR
- Viral culture
- Four-fold increase in swine flu influenza specific neutralizing antibodies.

Collect specimen

- a. Obtain and refrigerate a respiratory specimen for swine influenza A (H1N1) virus infection testing
- b. Collect upper respiratory specimens such as nasopharyngeal swab/aspirate or nasal wash/aspirate, combined nasal swab with or pharyngeal swab, endotracheal aspirate from intubated patients with appropriate personal protective precaution. Swabs with a synthetic tip (such as polyester, Dacron) and aluminum or plastic shaft should be used. Swabs with cotton tips and wooden shafts are not recommended.
- c. The collection vial should contain 1-3mL of viral transport media. Specimens should be placed in viral transport media and placed on ice (4⁰C) or refrigerated immediately for transportation to the laboratory. Once the samples arrive in the laboratory, they should be stored either in a refrigerator at 4⁰ C or in a -70 C freezer. If a -70 C freezer is not available, they should be kept refrigerated, preferably for 1 week.
- d. Specimens should be shipped on dry ice to the state public health laboratory in clearly labeled containers and should include all information requested by the state health laboratory.^{19,21,31}
- e. Contact state or local health department to facilitate testing at a state public health laboratory. Specimens should be sent to the nearest laboratory which has been equipped to test swine influenza A (H1N1) virus infection.^{19,31}

3. Hospitalization

Most cases of swine influenza A (H1N1) virus infection tend to be mild and self-limited and do not require visit to a health care provider or hospitalization.²² Provide medical International Journal of Medicine and Pharmaceutical Research

care to patients with severe illness and those at high risk for complications. The patients with severe illness and complications may require prolonged hospitalization, and in some cases ventilatory support. If patients are discharged early, both the patients and their families require education on personal hygiene and infection-control measures.^{23,24}

Antiviral therapy:

Laboratory testing has proven that the swine influenza A (H1N1) strain is sensitive to two antiviral medicines that are used to treat human influenza.

- Oseltamivir (Tamiflu)
- Zanamivir (Relenza).

Oseltamivir is given in the tablet form. Zanamivir is an inhaled medication.² However, this strain is resistant to adamantanes, such as amantadine and rimantadine.²⁵

Oseltamivir (Tamiflu):

- Oseltamivir is a prodrug that is hydrolyzed by the liver to its active metabolite. Oseltamivir is a neuraminidase inhibitor, serving as a competitive inhibitor of sialic acid, found on the surface proteins of normal host cells. By blocking the activity of the neuraminidase, oseltamivir prevents
- New viral particles from being released by infected cells.²⁶ Adverse effects of oseltamivir include nausea, vomiting and transient neuropsychiatric events (self-injury or delirium). These dangerous side effects occur more commonly in children and adolescents.²⁷ Nausea and vomiting might be less severe if oseltamivir is taken with food.

Zanamivir (Relenza)

Zanamivir is administered by inhalation with a dry powder inhaler.

Adults:

Treatment: Two 5 mg inhalations b.i.d.

Chemoprophylaxis: Two 5 mg inhalations once daily

Children:

Treatment: Two 5 mg inhalations b.i.d. (age 7 years.)

Chemoprophylaxis: Two 5 mg inhalations once daily (age 5 years.)

The mechanism of action is similar to oseltamivir. For young children oseltamivir may be preferable than zanamivir as it requires the patient to voluntarily inhale through the device. Zanamivir is not recommended for treatment for patients with chronic airway disease or asthma as it can induce bronchospasm.²⁸

(H) Prevention:

Swine flu has been a major threat for dental Professionals recently. so, the main aim of the dental professionals should be to prevent or limit the transmission of influenza to health care providers as well to patients. It can be done by:

Create awareness among staff^{10,19,21,25,29}

- Educating the staff about the symptoms, transmission and prevention of swine influenza A (H1N1) virus infection.
- Staff with respiratory symptoms should be instructed to stay at home and not come to work.
- Staff personnel should resume their duties once they are free from fever, or signs of a fever, for at

least 24 hrs, after the withdrawal of fever-reducing medications

- Dental health care personnel should do daily self assessment for symptoms of febrile respiratory illness (fever plus one or more of the following: Nasal congestion/runny nose, sore throat, or cough).
- If any member of the personnel has been diagnosed with 2009 H1N1 influenza, the personnel can continue his routine duties but should monitor himself for symptoms so that any illness is recognized promptly.

Early recognition of cases

- During a pandemic period, it is recommended that patients should be contacted at least 24 hours before their appointment to ensure that they are symptom free.
- All patients should be actively screened routinely for symptoms of influenza on entry to practice and before they enter the waiting room or clinical area.
- A disposable surgical mask should be offered to persons who are coughing, or provide tissues and no-touch receptacles for used tissue disposal.
- If the dentist suspects the patient is infected, elective dental treatment should be deferred and the patient should be advised to contact their general health care provider.
- If the dentist suspects the patient is infected and urgent dental care is required, which involves the generation of aerosols, (through the use of turbines, ultrasonic scalers and three-in-one syringes), the treatment to the patient should be provided in hospital with dental care facilities that provides airborne infection isolation (i.e.,airborne infection isolation room with negative pressure air handling with 6 to 12 air changes / hour).^{2,19,21}

Standard precautions (hand hygiene), contact precautions (gown & gloves) and droplet precautions: (goggle or full face shield):^{19,21,25,29,31}

- Both the dental health care providers and patients should cover the nose and mouth with disposable, single-use tissues when sneezing, coughing and wiping or blowing the nose.
- Disposal of used tissues in the nearest waste bin.c. Make sure to wash hands after coughing, sneezing, using tissues or contact with respiratory secretions and contaminated objects.
- keep hands away from the eyes, mouth and nose
- Wherever possible, practices should remove nonessential items (especially soft furnishings, also toys, books, newspapers and magazines) from reception and waiting areas.
- Before entering the treatment room the dental health care provider should wear recommended Personal protective equipment(PPE) which include gloves, a gown, eye protection and a National Institute of Occupational Safety and Health(NIOSH)fit-tested, disposable N95 respirator when entering the patient room and

when performing dental procedures on patients with suspected or confirmed 2009 H1N1 influenza.

Airborne precautions (N95 or equivalent respirator)

N95 filtering face piece respirators are air purifying respirators certified by the National Institute of Occupational Safety and Health to have filter efficiency level of 95% or greater against particulate aerosols free of oil and greater than 0.3 μ in size. The effectiveness of N95 respirators relies on how well the respirator seals to the user's face. To ensure N95 respirators work effectively, use the respirator model and size which fits properly as improper fit will likely result in inadequate protection. Do not use the respirator with beards or other facial hair as it may interfere with the direct contact between your face and the sealing surface of the respirator. Conduct a seal-check every time you put the respirator on. If the respirator becomes damaged, soiled or you experience problems with using the respirator such as breathing becomes difficult, dizziness, irritation you should leave the work area immediately and remove the respirator when you are no longer exposed to the potential airborne hazard. Use precautions for all patient care activities. Maintain precautions for 7 days after illness onset or until symptoms have resolved. Perform suctioning, bronchoscopy, or intubation in a procedure room with negative-pressure air handling. Instruct patient in respiratory hygiene/cough etiquette.^{30,31}

Precautions measures for environmental control

Use dedicated noncritical medical equipment such as stethoscope, thermometer whenever possible; otherwise, disinfect them after use. Follow established guidelines for isolation precautions, including housekeeping practices.^{19,31}

Disposition in Hospital

Notify hospital about Infection Control measures. Place patient in a single-patient room with the door kept closed in a hospital. If available, an airborne-infection isolation room with negative- pressure air handling can be used.^{19,31}

Visitors

Restrict access of visitors in hospital or clinic. Screen them for signs/symptoms of swine influenza A (H1N1) virus infection and educate them about infection control precautions.^{19,31}

Travelling

Advice patient with symptoms of swine influenza A (H1N1) virus infection not to leave home or travel. If symptoms develop during flight or public transport vehicle, the person with illness should protect others by wearing a facemask if tolerable to reduce the number of droplets coughed or sneezed into the air or use a tissue to cover their nose and mouth when coughing or sneezing. The person with illness should sit at least 6 feet apart from others without compromising flight safety. If the person with illness is travelling to a different country, the captain of the plane should report the illness to quarantine officials in the jurisdiction of the airport where the plane is expected to land prior to arrival or as soon as illness is noted. Quarantine officials will work with the airline and local and state health departments to assist with medical transportation of the patient upon arrival, disease control and containment

measures, passenger and crew notification and surveillance activities, and airline disinfection procedures.³²

Public gathering

Advice persons with swine influenza A (H1N1) like illness to avoid public gatherings and stay at home for 7 days after the onset of illness or at least 24 hours after symptoms have resolved, whichever is longer as it is difficult to maintain physical distance.³³

Table 1: Oseltamivir (Tamiflu) treatment and chemoprophylaxis

Oseltamivir (Tamiflu)	Treatment	Chemoprophylaxis
Adults Children 12 months	75 mg capsule b.i.d for 5 days	75 mg capsule once daily
15 kg	less 60 mg per day divided into 2 doses	30 mg once daily
15—23 kg	90 mg per day divided into 2 doses	45 mg once daily
24—40 kg	120 mg per day divided into 2 doses	60 mg once daily
>40 kg	150 mg per day divided into 2 doses	75 mg once daily

4. Conclusion

As dental health care professional, utmost alertness is required in identifying the positive cases and also referring them to appropriate health care centers. As dental professionals we should use all the necessary precautions to prevent the H1N1 infection. It is our duty as dental health care professional to follow the preventive procedures so that there would be no infections that spreads through the dental operatory.

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