



Background

1. Human infections with a novel influenza A (H1N1) virus that is easily transmissible among humans were first identified in April 2009.
2. Adverse pregnancy outcomes have been reported following previous influenza pandemics, with increased rates of spontaneous abortion and preterm birth reported, especially among women with pneumonia. Case reports and several epidemiologic studies conducted during interpandemic periods also indicate that pregnancy increases the risk for influenza complications for the mother and might increase the risk for adverse perinatal outcomes or delivery complications. New data from the ongoing H1N1 pandemic in the US suggests that 1/3 of pregnant women affected with H1N1 require admission into hospital.
3. These guidelines are adapted from guidelines from **Communicable Diseases Centre (CDC), US** (issued on 30th June 2009, from http://www.cdc.gov/h1n1flu/clinician_pregnant.htm), **Royal College of Obstetricians and Gynaecologist (RCOG), UK** (issued on 8th and 9th July 2009, from <http://www.rcog.org.uk/files/rcog-corp/RCOG%20guidance%20H1N1v%20-%20final.pdf> and <http://www.rcog.org.uk/files/rcog-corp/Swine%20Flu%20Pregnancy%20Algorithm%20-%20final.pdf>), **Ministry of Health** Circular 81/2009 issued on 13th July 2009, and **WHO guide for field operations on "Collecting, preserving and shipping specimens for the diagnosis of avian influenza A (H5N1) virus infection"** issued on Oct 2006.
4. In addition, Ministry of Health (Singapore) has issued various up-to-date guidelines for the use of personal protection equipment, triaging and management of patients with H1N1. The most up-to-date guidelines from MOH should be used in conjunction with these guidelines. Clinicians are encouraged to read the guidelines from CDC (US) and RCOG (UK) in full.

Clinical presentation

1. Pregnant women with novel influenza A (H1N1) virus infection would be expected to present with typical acute respiratory influenza-like illness. Symptoms would include:
 - a. cough
 - b. sore throat
 - c. rhinorrhea
 - d. fever
 - e. body aches
 - f. headache
 - g. fatigue
 - h. occasionally vomiting and diarrhea
2. Many pregnant women will go on to have a typical course of uncomplicated influenza. However, for some pregnant women, illness might progress rapidly, and might be complicated by secondary bacterial infections including pneumonia.
3. Fetal distress associated with severe maternal illness can occur.
4. Case reports of adverse pregnancy outcomes and maternal deaths have been associated with severe illness.

Testing for influenza H1N1

1. Ideally, pregnant women who have suspected novel influenza A (H1N1) virus infection should be tested for influenza. However, treatment should not be delayed pending results of testing and treatment should not be withheld in the absence of testing. This is because antiviral treatment is most effective when started as early as possible after the onset of symptoms (i.e. within the first 2 days).
2. Use only sterile dacron or rayon swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden or aluminium shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing.
3. Hold the swab between the thumb and first and second fingers like a pencil (see Figure 1) and not between the thumb and forefinger with the base in the palm of the hand (Figure 2). This is to avoid hurting both yourself and the patient should the shaft of the swab slide in either direction.
4. Hold tongue out of the way with a tongue depressor (Figure 3).
5. Ask the patient to say "aahh" to elevate the uvula. Use a sweeping motion to swab the posterior pharyngeal wall and tonsillar pillars. Avoid touching the soft palate and tongue.
6. Place the swab immediately into the swab sheath or a sterile screw-capped container. **Swabs for PCR should be sent dry.** Break the applicator sticks off near the tip to permit tightening of the cap. Dry swabs should be sent to the diagnostic laboratory as soon as possible and preferably within 24 hours, to ensure the accuracy of the test. The use of Universal Transport Medium (UTM), as opposed to a dry swab, is recommended if delay in the transport of the specimen is expected.
7. **BIO SAFETY REQUIREMENTS ON SPECIMEN PACKAGING** - Specimens should be packed for transport as follows:
 - a. Place swabs in a leak-proof container i.e. swab tube, and ensure that the cap is securely tightened.
 - b. Place the specimen tube into a zip lock bag and seal to close.
 - c. Place within a second zip lock bag and seal to close.
 - d. Label with the biohazard logo.



Figure 1. Swab held correctly



Figure 2. Swab held incorrectly

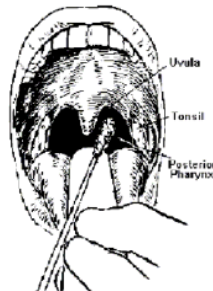


Figure 3. Taking a throat swab

Treatment Recommendations

Antiviral medication

1. The currently circulating novel influenza A (H1N1) virus is sensitive to antiviral medications zanamivir (Relenza®) and oseltamivir (Tamiflu®).
2. The drug of choice for treatment of pregnant women with H1N1 differs between the US and UK guidelines.
 - a. CDC, US recommends that the drug of choice for pregnant women is oral oseltamivir (Tamiflu®) 75 mg bd for 5 days because of its systemic activity.
 - b. RCOG, UK recommends that the drug of choice for pregnant women is zanamivir (Relenza®) 10 mg bd through nasal spray for 5 days because of its limited systemic activity and hence less theoretical effects on the fetus. As its use may be associated with wheezing, it is relatively contraindicated in asthmatics. It may also not be the drug of choice for unusually severe flu illness.

Fever Treatment

1. One of the more well-studied adverse effects of influenza is its associated hyperthermia. Studies have shown that maternal hyperthermia during the first trimester doubles the risk of neural tube defects and may be associated with other birth defects and adverse outcomes. Limited data suggest that the risk for birth defects associated with fever might be mitigated by antipyretic medications and/or multivitamins that contain folic acid.
2. Maternal fever during labor has been shown to be a risk factor for adverse neonatal and developmental outcomes, including neonatal seizures, encephalopathy, cerebral palsy, and neonatal death.
3. Paracetamol appears to be the best option for treatment of fever during pregnancy.

Consider admission to hospital

1. Consider admission into hospital if:
 - a. Displaying signs / symptoms of severe illness:
 - i. dyspnea or chest pain
 - ii. severe and persistent vomiting
 - iii. deterioration of symptoms since onset of illness
 - iv. flu-like symptoms seemingly improved but then regressed with worsening cough altered mental status
 - b. Physical examination findings consistent with pneumonia
 - c. Signs of non-reassuring fetal status

Chemoprophylaxis

1. Pregnant women appear to be at higher risk for severe complications from novel influenza A (H1N1) virus infection, and the benefits of treatment or chemoprophylaxis with oseltamivir or zanamivir outweigh the theoretical risks of antiviral use.
2. Post exposure antiviral chemoprophylaxis can be considered for pregnant women who are close contacts of persons with suspected or laboratory confirmed novel influenza A (H1N1) virus infection. Both Tamiflu® and Relenza® can be used for chemoprophylaxis.
3. Zanamivir (Relenza®) 10 mg once a day has limited systemic absorption and has theoretical advantages especially for chemoprophylaxis in the first trimester.
4. For women with asthma, oseltamivir (Tamiflu®) 75 mg once a day may be preferred.

5. Recommended duration of chemoprophylaxis is for 10 days after the last known exposure to novel influenza A (H1N1).
6. Close contact with family members who have influenza-like illness should as much as possible be avoided. In situations where multiple exposures are inevitable, the total length of chemoprophylaxis for a pregnant woman may depend on clinical considerations. Close monitoring for influenza like illness in exposed pregnant women is recommended.

Table 1. Antiviral medication dosing recommendations for treatment or chemoprophylaxis of novel influenza A (H1N1) infection

Agent, group	Treatment	Chemoprophylaxis
Oseltamivir		
Adults	75-mg capsule twice per day for 5 days	75-mg capsule once per day for 10 days
Zanamivir		
Adults	Two 5-mg inhalations (10 mg total) twice per day for 5 days	Two 5-mg inhalations (10 mg total) once per day for 10 days

Other ways to reduce risk for pregnant women

There is no vaccine available yet to prevent novel influenza A (H1N1) virus infection; however, the risk for novel influenza A (H1N1) virus infection might be reduced by taking steps to reduce the chance of being exposed to respiratory infections. These steps include:

1. Frequent hand washing.
2. Minimizing contact with sick individuals.
3. Having ill persons stay home (except to seek medical care).
4. Having ill persons cover coughs.
5. Avoiding, whenever possible, crowded settings
6. Use facemasks when in crowded settings.

Infant feeding considerations

1. Infants who are not breastfed are more vulnerable to infection and hospitalization for severe respiratory illness than infants who are breastfed. Women who are not ill with influenza should be encouraged to initiate breastfeeding early and feed frequently. Ideally, babies should receive most of their nutrition from breast milk. Eliminate unnecessary formula supplementation, so the infant can receive as much maternal antibodies as possible.
2. Infants are thought to be at higher risk for severe illness from novel influenza A (H1N1) infection and very little is known about prevention of novel H1N1 flu infection in infants. The risk for novel influenza A (H1N1) transmission through breast milk is unknown. However, reports of viremia with seasonal influenza infection are rare, which suggests that the risk of virus crossing into breast milk is also probably rare.
3. For sick women who do not have anyone to help with infant care while they are ill, they should do the following:
 - a. Wear face masks when providing infant care and feedings.
 - b. Hands must be washed and kept clean at all times when in contact with infants.
 - c. Clothes which may be contaminated from used tissues or runny noses should be changed and washed. Take special care over their baby's hygiene – wash thoroughly with soap and water any items that have been in the baby's mouth.
 - d. Keep the infant away from persons who are ill and out of crowded areas.

- e. Limit sharing of toys and other items that have been in infants' mouths. Keep surroundings, cots and other equipment clean.
4. For sick women who have someone to help with infant care, there are 2 schools of thought:
- a. CDC, US recommends that sick women who are able to express their milk for bottle feedings by a healthy family member should be encouraged to do so. Antiviral medication treatment or prophylaxis is not a contraindication for breastfeeding. If possible, only adults who are not sick should care for infants, including providing feedings.
 - b. RCOG, UK recommends that sick women should be encouraged to maintain skin-to-skin contact with their babies provided they do the recommended tasks as in point 3.

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