



Royal College of
Obstetricians and
Gynaecologists

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Pandemic H1N1 2009 Influenza: Clinical Management Guidelines for Pregnancy

*Guidelines for Pregnancy prepared by the
Department of Health and the Royal College of
Obstetricians and Gynaecologists*

First published: October 2009

Prepared by the Department of Health and the Royal College of Obstetricians and Gynaecologists

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First published October 2009

Published to Delphi, in electronic format only.

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Summary

1. Most disease seen in children and adults, including pregnant women, with pandemic H1N1 2009 influenza is mild.
2. Differentiation from other viral and bacterial infections may be difficult in pregnant women, and there should always be a heightened awareness that some obstetric complications may mimic the presentation of the illness e.g. chorioamnionitis.
3. Pregnant women should be offered antiviral treatment if H1N1 is suspected before the results of confirmatory tests are available.
4. Antibiotics should be considered in selected cases: signs of bacterial or respiratory tract infection, failure to respond to antiviral therapy, underlying diagnoses, and severe H1N1 disease.
5. Pandemic guidance is based on evidence about other similar conditions together with limited information on pandemic H1N1 2009 influenza. This means that clinical judgment must remain paramount.

Introduction

1. Provisional guidance for the clinical management of patients with symptoms of influenza-like illness, severe influenza and complications was provided in 2007 by the British Infection Society, British Thoracic Society and Health Protection Agency in collaboration with the Department of Health¹.
2. Knowledge of H1N1 2009 continues to increase and the majority of existing clinical guidance continues to be valid. This document has been produced in the light of clinical experience during the first wave of the pandemic and has been endorsed by the clinical sub-group of the Pandemic Influenza Clinical and Operational Advisory Group. It is issued together with an update on the clinical management of children and adults with an influenza-like illness, severe influenza and complications.
3. These guidelines are only intended for use during the H1N1 2009 influenza pandemic.
4. These guidelines will be updated regularly. Users are advised to refer to the latest web-based guidelines at all times which will be posted on, among others, the RCOG and Department of Health websites.

1. Clinical epidemiology

The information is taken from various data sources including the First Few Hundred study undertaken by the Health Protection Agency (FF100), HPA case follow-up and the Influenza Clinical Information Network (FLU-CIN) database. Only data of immediate relevance to clinical practice is included here.

1.1 Implications for pregnancy

Women who are pregnant are not known to be at increased risk of catching H1N1 2009 influenza (swine flu). However, due to the changes in their immune systems to accommodate their developing fetus and adaptations in their body as a result of the hormonal and physical changes, they are at greater risk of developing complications should they acquire the illness².

In primary care:

1. The likelihood of infection with pandemic H1N1 2009 influenza is strongly influenced by age; the young are at most risk and those aged >60 years at least risk. Approximately 60% of patients with confirmed H1N1 2009 influenza virus infection are aged 16 to 64 years. However, case fatality increases with age, apart from the youngest children where it is also high.
2. Antiviral use as early as possible, in particular within the first 48 hours of onset of symptoms, reduces the risk of serious illness.

In secondary care:

1. Less than 1% of all patients are admitted to hospital.
2. Due to their physiological changes, pregnant women have been shown to be at risk of respiratory complications, especially in the 2nd and 3rd trimesters³.
3. Pregnant women have been noted to have a 4 times higher risk of being hospitalised for complications compared to the non pregnant population³.
4. Pregnant women are over represented in the group of patients admitted to hospital requiring Level 2 (High Dependency Care) or Level 3 care (Critical/Intensive Care). Observations from the USA⁴, Canada⁵ and Australasia⁶ showed that pregnant women formed between 7% and 9% of admissions to Intensive Care Units.
5. Most patients admitted to hospital (80%) have not previously been started on an antiviral drug. Only 24% of the hospitalised women commenced antiviral treatment within 48 hours of onset of their symptoms.
6. The mortality rate for all hospitalised adults is approximately 6%. The overall maternal mortality rate is not determined.

7. Patients with underlying co-morbidities fare worse. The risk of both hospital admission and death are strongly influenced by co-morbidities. In hospitalised adults significant risk factors for fatal outcome include COPD, diabetes and heart disease. Obesity appears to be a risk factor for requirement for critical care but not for death. Similar co-morbidities were also observed in pregnant women with severe complications⁷.
8. The presence of pneumonia on admission is not influenced by sex, age or underlying co-morbidity.

1.2 Predictive risk factors for ICU admission⁸

These are:

- dyspnoea (strongly predictive of both death and ICU requirement)
- requirement for supplemental oxygen (strongly predictive of ICU care and death)
- pneumonia on admission (strongly predictive of significant complications after admission – including ICU multi-organ support and death)
- heart rate in adults (the higher the pulse the greater the chances of ICU care being required)
- altered conscious level

1.3 Clinical features of H1N1 2009 influenza virus infection

1. The vast majority of patients in the first wave of the pandemic H1N1 2009 influenza in the UK experienced mild illness with 50% of patients recovering within 7 days of symptom onset and a further 25% within 10 days⁸. The main symptoms reported were fever, fatigue, dry cough, sore throat and headache.
2. However, severe gastrointestinal disease (nausea, vomiting, diarrhoea, abdominal pain) has been a feature of H1N1 infection in children and adults requiring admission.
3. Complications of H1N1 2009 influenza appear similar to seasonal influenza. Myocarditis has been observed, usually associated with a marked tachycardia. The prognosis is unclear, though influenza-related myocarditis usually has a good prognosis for recovery.

4. As with seasonal influenza, neurological complications such as seizures and encephalitis, with altered mental state, can occur⁹. The prognosis for patients with isolated neurological symptoms which can be optimised without requirement for ICU admission appears good.
5. Clinicians should be aware of the potential for severe bacterial co-infections among pregnant women with severe influenza and treat accordingly.
6. The initial symptoms of rapidly-lethal infections such as meningitis, encephalitis and bacteraemia can resemble those of influenza.

1.4 Influenza-related pneumonia

1. Influenza-related pneumonia has occurred in 40% of hospitalised patients in the United States, usually with bilateral infiltrates apparent in the chest x-ray⁴. Amongst patients with H1N1 influenza admitted to ICUs in New Zealand and Australia, 49% had viral pneumonitis or ARDS and 20% had secondary bacterial pneumonia.⁶
2. One report from the US of post mortem samples identified a bacterial co-pathogen in 29% of cases¹⁰ including *Streptococcus pneumoniae*, *S. pyogenes*, *Staphylococcus aureus*, *S. mitis* and *Haemophilus influenzae*. Bacterial pneumonia was not suspected prior to death in these patients.
3. The assessment of disease severity in patients with influenza-related pneumonia remains a matter of clinical judgement. Currently, no specific prognostic markers have been identified for H1N1-related pneumonia.

1.5 Antiviral therapy

1. In patients with seasonal influenza A infection, antiviral treatment is most effective if it is commenced as soon as possible and in any event within 48 hours of symptom onset. However, recent experience with hospitalised patients reveals that antivirals given more than 48 hours⁴ and up to 7 days after symptom onset also confer benefit.

2. The neuraminidase inhibitors, oseltamivir and zanamivir, are both active against pandemic H1N1 2009 influenza. In comparison to oseltamivir, zanamivir given by inhalation is effective in the respiratory tract, but does not reach effective levels systemically. At the present time, oseltamivir-resistance remains rare and no onward transmission of resistant virus has occurred.

1.6 The Swine Flu Clinical Package

1. The swine flu clinical package is a set of tools for use by frontline healthcare professionals, in severe and exceptional circumstances, during a pandemic situation¹¹. The package contains community assessment tools, a referral letter and hospital pathways.
2. The package is for use only when high healthcare demand leads to the need for strict hospital admission triage in affected areas. They should not be used when emergency departments and acute admissions units are working with their usual establishment of trained staff, and can operate their usual daily decision pathways, including provision of hospital beds for all those who normally require admission.
3. The assessment tools in the swine flu clinical package are not intended for patients who present for diagnosis and treatment of uncomplicated influenza at an emergency department. These patients should be directed to use the normal routes for obtaining antivirals in the community, such as the National Pandemic Flu Service, or to contact a primary care surgery or clinic.

2. Recommendations for primary care

2.1 Assessment and management of pregnant women in primary care

1. Pregnant women with clinically defined uncomplicated influenza infection would be expected to make a full recovery. They require good symptomatic management, early access to antiviral treatment, information about the natural history, and advice as to when to re-consult.

2. Mild fever, coryza, and new cough are common features of many viral respiratory tract infections and in most pregnant women can safely be managed at home with fluids and antipyretics, namely paracetamol. Non steroidal anti-inflammatory drugs are contraindicated in pregnancy.
3. Over-the-counter cough and cold medicines should not be used as they may contain extra doses of paracetamol or ibuprofen.
4. Patients with acute exacerbations of asthma should be treated according to established evidence-based guidelines for the management of asthma in addition to antiviral therapy¹².
5. Patients with dyspnoea or recrudescence of fever not responding to treatment should be examined to assess the presence and severity of influenza-related pneumonia, and the need for hospital referral.
6. Women should be asked to inform their GP if their condition deteriorates or if they discontinue antiviral treatment before completing the course.

2.2 Recommendations for antiviral use in pregnancy and breastfeeding

1. Early initiation of antiviral treatment for pregnant women with influenza is recommended.
2. Pregnant women presenting with uncomplicated illness due to influenza, and who have no evidence of systemic disease, can be offered either zanamivir (Relenza) or oseltamivir (Tamiflu). In view of the lower systemic exposure, zanamivir is recommended as first choice during pregnancy, although either drug can be used. If the patient suffers from conditions such as asthma or chronic pulmonary disease, or may have difficulty with an inhaled preparation, oseltamivir should be used.
3. Pregnant women developing severe systemic or complicated disease due to influenza will typically be treated as an inpatient and should be offered treatment with oseltamivir.

2.3 Empiric antibiotics for pregnant women in primary care

1. Pregnant women do not routinely require antibiotics if they have uncomplicated influenza and were previously healthy.
2. Pregnant women with features of influenza complicated by lower respiratory tract signs, severe painful pustular tonsillitis/sore throat, severe painful cervical lymphadenopathy and significant acute suppurative otitis media who are not referred to hospital, should be offered empirical antibiotic therapy.
3. When antibiotics are indicated, women should receive co-amoxiclav, or clarithromycin if penicillin/amoxicillin allergic.
4. A five-day course of an oral antibiotic should be adequate for most patients deemed suitable for treatment in the community. Patients should be warned to seek further medical attention if symptoms persist or deteriorate.
5. Patients with pre-existing co-morbidities (such as chronic lung, heart, renal, liver or neuromuscular disease and immuno-suppression) who are therefore at high risk of severe disease and complications, and who present with an influenza-like illness, should be strongly considered for antibiotics in accordance with NICE guidelines on Respiratory Tract Infections¹³.
6. Patients presenting with an exacerbation of COPD should be considered for antibiotics in accordance with existing guidelines for the management of COPD^{14,15}.

2.4 Review and reassessment in the community

It is inevitable that some pregnant women will develop significant flu complications and others a potentially serious non-flu illness.

1. When reviewing a pregnant woman who is not responding to standard management clinicians should consider alternative diagnoses, such as bacterial pneumonia.

2. GPs must advise women to seek medical advice without delay if their condition suddenly worsens.
3. It is important not to miss any obstetric complications such as pre-eclampsia or pulmonary embolism that may present with abdominal pain or respiratory symptoms or signs, for example tachypnoea, pleuritic chest pain or desaturation.

2.5 Criteria for referral to hospital

1. Indicators for hospital referral are not exclusive but include:
 - a. signs of respiratory distress (dyspnoea, tachypnoea)
 - b. peripheral oxygen saturation \leq 94% in air
 - c. dehydration or shock
 - d. any sign of sepsis
 - e. altered conscious level
 - f. seizures
2. In all patients with a clinical diagnosis of influenza-related pneumonia, hospital referral and assessment should be considered for those with dyspnoea.
3. Measurement of peripheral oxygen saturation by pulse oximetry is essential to exclude hypoxaemia. Absence of cyanosis does not exclude hypoxaemia.
4. All pregnant women who have a peripheral oxygen saturation measured by pulse oximetry (SpO₂) less than 94% should be actively considered for hospital referral and oxygen supplementation¹⁶.

5. Guidance should not supersede the decision of an experienced clinician to refer a sick woman to hospital for further assessment and management.
6. Clinicians should always be aware of obstetric complications that may present in an atypical way, mimicking symptoms or signs of flu, such as:
 - tachypnoea and tachycardia - common in pulmonary embolism
 - epigastric pain, headaches or mild elevation of BP – found in pre-eclampsia or placental abruption.

3. Recommendations for secondary care

3.1 Assessment and management of pregnant women in secondary care

Pregnant women admitted with respiratory complications should be managed jointly between the obstetric and medical teams. An assessment needs to be made with respect to the best place to manage the woman. Women requiring more respiratory support may be best managed in the Respiratory Unit with close input by the obstetric and midwifery teams. If a woman is in labour, she would be best managed in the Delivery Unit with input from the Respiratory team and the Obstetric Anaesthetic team. Following delivery, she may need to be transferred to the clinical area that would be best to provide expert care for her.

1. Consideration and exclusion of other pathologies (e.g. severe chorioamnionitis, group A or B streptococcal infections) must be part of the assessment of critically ill women, since these will continue to present during an influenza pandemic.
2. For patients admitted to hospital, the appropriate early warning tools should be used to facilitate identification of deteriorating patients.

3. Patients with worsening of pre-existing co-morbid medical conditions should be managed according to best practice for that condition with reference to published disease-specific guidelines, if available.
4. Treatment with oseltamivir should be started on clinical grounds whilst awaiting test results. Clinicians should liaise with local experts for the most up to date guidance on antivirals in particular when considering deviating from national guidance.
5. For patients who have low blood pressure and compromised urine output / renal function, intravenous fluid boluses are a routine and appropriate initial therapy. However, there are some early indications that excessive fluid volumes may lead to serious pulmonary compromise. For patients whose condition seems refractory to fluid resuscitation it may be advisable to consider central venous cannulation and early initiation of inotrope / vasopressor support.

3.2 Recommendations for antiviral use in pregnancy and breastfeeding

1. Early initiation of antiviral treatment for pregnant women with influenza is recommended.
2. Pregnant women presenting with uncomplicated illness due to influenza, and who have no evidence of systemic disease, can be offered either zanamivir (Relenza) or oseltamivir (Tamiflu). In view of the lower systemic exposure, zanamivir is recommended as first choice during pregnancy, although either drug can be used. If the patient suffers from conditions such as asthma or chronic pulmonary disease, or may have difficulty with an inhaled preparation, oseltamivir should be used.
3. Pregnant women developing severe systemic or complicated disease due to influenza will typically be treated as an inpatient and should be offered treatment with oseltamivir.
4. Consideration should be given to extending the duration of antiviral treatment in critically ill pregnant women.

3.3 Maternal pyrexia

Epidemiological studies have linked uncontrolled maternal pyrexia to miscarriage¹⁷ and fetal abnormalities such as neural tube and cardiac defects¹⁸. Maternal pyrexia is also a recognised risk factor for preterm delivery¹⁹. The importance of control of maternal pyrexia with regular and effective doses of paracetamol and hydration should be emphasised.

3.4 Antenatal corticosteroids

1. Current obstetric practice is to administer corticosteroids e.g. 2 doses of betamethasone (12mg) 12 or 24 hours apart to promote fetal lung maturity in situations of threatened pre-term labour or where a decision is made to deliver the fetus prematurely for maternal or fetal reasons. The effects on the maternal immune system from a single course of corticosteroids are unclear but the evidence does not suggest that it results in sufficient immuno-suppression to cause maternal harm or exacerbation of infection²⁰.
2. As the administration of corticosteroids is important for the promotion of fetal lung maturity, and on the basis that the benefits outweigh the risks, it is recommended that the current practice continues²¹. Whilst there may be evidence that repeated (rescue) doses of corticosteroids may be beneficial for fetal reasons²¹, studies have shown that these may lead to maternal secondary adrenal insufficiency and fetal complications²². The practice of repeated (rescue) doses of corticosteroids is not recommended.

3.5 Decision for delivery

1. Most mothers with symptoms of influenza in labour will be able to tolerate labour with adequate pain relief and hydration.
2. When a symptomatic woman is admitted with complications of influenza, early involvement of the obstetric anaesthetists, respiratory physicians and haematologists is important to set out a clear management plan.

3. In most cases, the decision to deliver will be made for an obstetric indication. In the event of a critically ill woman close to term, there would be a clinical indication to deliver her, usually by caesarean section, to help with her mechanical ventilation. This should be done once her clinical condition is stabilised and other potential complications such as coagulopathy have been excluded or corrected.
4. Most of the respiratory complications have been shown to occur in the 2nd and 3rd trimesters³. There may be situations where a preterm baby needs to be delivered in order to improve the outcome for ventilation of a very ill mother. The decision is a clinical one, in conjunction with the obstetric, critical care and neonatal teams. The pregnant woman should be informed but if unable to participate in clinical decision making, the partner or close relatives should usually be involved in discussions. In order to improve the outcome for the premature infant, betamethasone (in accordance with the guidance above) should ideally be administered at least 24 hours prior to delivery.
5. It is unlikely that pregnancies in the 1st or early 2nd trimesters will need to be terminated unless it is felt that continuation of the pregnancy will be detrimental to the woman's condition.
6. There may be occasions where a woman who is booked for elective caesarean section becomes symptomatic at the time of the planned procedure. If possible, it would be advisable to commence her on antivirals and to delay the procedure by about 5 days, to allow her to recover, in order not to increase her risks of respiratory complications, and also to reduce the risk of spread to other patients and staff.

3.6 Potential complications

Amongst the potential complications set out later in this document, obstetricians with experience of managing critically ill women with H1N1 flu have reported the following observations²³:

- Disseminated intravascular coagulation

- Cognitive impairment post viraemia/encephalitis
- Psychological effects after the recovery phase, requiring appropriate support
- Venous thromboembolism and pulmonary embolism²⁴

3.7 Postnatal management

1. Women in the postnatal period are probably at lower risk of respiratory complications because the effects of the gravid uterus on the lungs have been removed. However, they may still experience similar complications if they are infected and there is a risk of transmission to the newborn infant. They should observe the same strict hygiene measures and be offered antiviral medication i.e. oseltamivir if clinically indicated. They should be encouraged to breastfeed.
2. Breastfeeding is important for babies and should be continued if at all possible, even when the mother is affected by swine flu. The benefits of breastfeeding are significant and are two-fold: (i) it gives babies the most appropriate nutrition for health and promotes attachment between mother and baby and (ii) colostrum is rich in antibodies which will help to protect the baby from many infections.
3. Women who are breastfeeding and have symptoms of influenza should be treated with an antiviral medicine. The preferred medicine is oseltamivir, as for other adults. However, if a baby is born and breastfeeding is started while the woman is taking zanamivir, she should complete the course of zanamivir; it is not necessary to switch to oseltamivir.

3.8 Empiric antibiotics for pregnant women in secondary care

These guidelines offer recommendations for the empirical antibiotic regimen in patients with influenza-related pneumonia and other respiratory tract infections.

1. Pregnant women with features of influenza complicated by lower respiratory tract signs, severe painful pustular tonsillitis/sore throat, severe painful cervical lymphadenopathy

and significant acute suppurative otitis media should be offered empiric antibiotic therapy, whether or not they are admitted to hospital.

2. A patient with uncomplicated influenza admitted to hospital for other reasons e.g. pre-eclampsia or antepartum haemorrhage and who has no risk factors for severe disease does not routinely require antibiotic therapy.
3. Patients with pre-existing co-morbidities (such as chronic lung, heart, renal, liver or neuromuscular disease, immuno-suppression and obesity) who are therefore at high risk of severe disease and complications, and who present with an influenza-like illness, should be strongly considered for antibiotics in addition to antiviral treatment.
4. Most patients with non-severe influenza-related pneumonia can be treated with oral antibiotics. When antibiotics are indicated, pregnant women should receive co-amoxiclav (or clarithromycin if penicillin allergic). A total of five days of antibiotics is recommended.
5. Antibiotics should ideally be administered within four hours of admission.
6. Patients with severe influenza-related pneumonia should be treated promptly with parenteral antibiotics. An intravenous combination of co-amoxiclav together with a macrolide such as clarithromycin is preferred. In patients who are penicillin allergic, a second generation cephalosporin, such as cefuroxime, may be an alternative to co-amoxiclav. The appropriate antibiotics should be discussed with a microbiologist at the earliest opportunity.
7. In adults with severe, microbiologically undefined pneumonia, a 10 day course of treatment is proposed. This should be extended to 14–21 days where *S. aureus* or Gram negative enteric bacilli pneumonia is suspected or confirmed²⁵.
8. Adult patients presenting with an exacerbation of COPD should be considered for antibiotics in accordance with existing guidelines for the management of COPD^{14,15}.

9. The use of antibiotics should be reviewed daily. Prophylactic or prolonged use of antibiotics for pneumonia may increase the risk of late superinfection with resistant organisms particularly in those requiring prolonged ventilatory support. Such infections are often associated with rapid deterioration.
10. Empirical antibiotic therapy should be switched to narrow spectrum antibiotics if there is laboratory confirmation of infection with sensitive organisms.
11. Intravenous antibiotics should be switched to orally administered antibiotics as soon as the physician judges this to be appropriate.

3.9 Respiratory disease

1. In adult patients not at risk of hypercapnic respiratory failure, the recommended target oxygen saturation range is 94 to 98%¹⁶.
2. Hypoxaemic patients should receive appropriate oxygen therapy with monitoring of oxygen saturations and inspired oxygen concentration.
3. Hypoxaemia is a common cause for escalation to critical care, so oxygen saturation monitoring on the ward is an important observation, along with clinical signs of respiratory distress and exhaustion.
4. High-dose corticosteroids have been associated with prolonged viral shedding in seasonal and H1N1 influenza virus infections and increased mortality in H5N1 influenza-related pneumonia/pneumonitis. Their use also carries substantial risks of side effects. However, because of the potential benefits to fetal lung maturity, antenatal corticosteroids (see section above) are not regarded as 'high dose' in this context, and should still be administered when considered appropriate, including for pregnant women who may have to be ventilated because of H1N1-related ARDS or other severe respiratory problems.

3.10 Influenza-related pneumonia in adults

1. In patients presenting with an influenza-like illness and features of pneumonia, the local epidemiology of H1N1 2009 influenza should be taken into account when making a diagnosis of either H1N1 influenza-related pneumonia or non-H1N1 related community acquired pneumonia.
2. When assessing disease severity, clinical judgement must be applied in all instances.
3. Patients with bilateral lung infiltrates on chest radiography consistent with primary viral pneumonia should be managed as having severe pneumonia.

3.11 Cardiovascular disease and shock

1. Cardiac enzymes can be raised (troponin and CK-MB) and this must be differentiated from the raised CK due to myositis or rhabdomyolysis that may also be seen in influenza.
2. Patients should be assessed for cardiac complications and their need for appropriately monitored intravenous fluids. However, the risk of excessive fluid volumes leading to serious pulmonary or cardiac compromise requires consideration. For patients whose condition seems refractory to fluid resuscitation it may be advisable to consider central venous cannulation and early initiation of inotrope / vasopressor support.

3.12 Neurological disease

1. Seizure control and airway management should follow standard guidelines. Patients with evidence of pre-eclampsia should be managed according to standard protocols for eclampsia.
2. CT scans and other imaging techniques should be considered, as per usual practice, to exclude other pathology. If patients have a significant degree of conscious level

impairment (GCS<10) they may need to be intubated and ventilated for safety reasons prior to a scan being performed.

3.13 Microbiology investigations

The range, availability and turnaround times of microbiological investigations will vary depending on local factors and the degree of pressure on clinical and laboratory services. Further advice/information should be sought from local microbiologists.

1. PCR is more sensitive than immuno-fluorescence for H1N1 detection and hence should be used in preference.
2. Antiviral and antimicrobial treatment, where clinically indicated, should not be delayed pending the results of investigations.
3. Ideally, all patients admitted to hospital with influenza-like illness should be tested as a minimum for H1N1 in order to facilitate appropriate treatment and infection control precautions.
4. Where virological testing cannot be offered to all cases, high priority should be accorded to virological confirmation of H1N1 (as a minimum) in patients admitted with influenza-like illness who are in high risk groups, including pregnant women, those admitted to critical or high dependency care or who have influenza-related pneumonia.
5. When deterioration occurs viral and bacterial screening should be repeated to screen for other pathogens.
6. Bacteriological investigations should be undertaken in critically ill patients and those with evidence of influenza-related pneumonia, and should follow locally agreed protocols and/or BTS Community Acquired Pneumonia Guidelines 2009.
7. The following bacteriology investigations are recommended as a minimum: blood cultures, pneumococcal and legionella urine antigen (where offered locally), and culture of purulent sputum or other lower respiratory tract samples.

8. If patients continue to deteriorate whilst on antiviral treatment, consideration should be given to testing for antiviral resistance and advice should be sought from a microbiologist.

3.14 Infection control

1. Management of patients with ongoing respiratory symptoms should be in accordance with local guidelines for infection control.
2. It is appropriate to observe full infection control measures for all suspected cases pending laboratory results. Isolation is preferred to cohorting, if feasible. Diligence in hand hygiene must be maintained at all times and in particular between patients.
3. Correct protective equipment is required during potential infectious aerosol generating procedures (AGPs) such as tracheostomy toilet, intubation and bronchoscopy. Such AGPs are listed in current DH & HPA infection control guidelines.
4. The use of Entonox is not considered an aerosol generating procedure. The use of surgical masks and eye protection in addition to plastic aprons is recommended in the delivery room with an infected woman. As there is splash risk with caesarean sections and instrumental deliveries, the same precautions apply.
5. Non-invasive ventilation (NIV) is potentially an infectious aerosol generating procedure and correct personal protective equipment (PPE) should be worn when caring for patients. Nosocomial spread has been reported in this context associated with sub-optimal PPE usage. Respiratory and/or critical care units experienced in the use of NIV are best placed to ensure the appropriate infection control measures are adopted at all times.

3.15 Escalation and referral to critical care in pregnancy

Criteria for identifying pregnant women who may benefit from critical care and which should trigger discussion with intensivists would include:

1. Severe dyspnoea
2. Patients with influenza-related pneumonia or who have bilateral primary viral pneumonia
3. Hypoxaemia with PaO₂ <8 Kpa despite maximal oxygen administration
4. Progressive hypercapnia
5. Refractory hypotension (some emerging evidence suggests that excessive fluid resuscitation may contribute to the severity of respiratory compromise)
6. Septic shock
7. Severe acidosis (pH<7.26)
8. GCS<10 or deteriorating conscious level

3.16 Reporting morbidity and mortality

1. The UK Obstetric Surveillance System is collecting information on pregnant women who are admitted to hospital with symptoms of H1N1. Cases with suspected or confirmed H1N1 can be reported to UKOSS via www.npeu.ox.ac.uk/ukoss
2. Any maternal deaths related to H1N1 2009 influenza will be assessed rapidly by the Centre for Maternal and Child Enquiries (CMACE) www.cmace.org.uk. Any maternal death should be reported to the local CMACE office in the usual manner, but be identified as a death related to influenza in order to be assessed rapidly so that lessons learnt can be disseminated.

3.17 Post-mortem examination

1. Clinicians are encouraged to seek post-mortem examination of fatal cases of influenza-like illness and influenza-related pneumonia.

2. Post-mortem examination should include comprehensive virological and bacteriological investigation.
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Acknowledgement

PICO would like to thank members of the RCOG Working Group on Pandemic Influenza and the Department of Health Maternity Team for their helpful comments.

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