

PANDEMIC H1N1 2009 CLINICAL PRACTICE NOTE

– MANAGING CRITICALLY ILL CASES

CAVEAT

This practice note is presented to clinical colleagues to assist the management of cases of A(H1N1). The recommendations are based primarily on adult ICU practice and arise from the international H1N1 ICU network teleconferences held since 5 June 2009, with the most recent occurring on 22 July 2009. These participants have included Intensivists from Scottish, English, Northern Irish and Welsh hospitals, along with colleagues from Mexico, the US, Canada, Australia, New Zealand and the Republic of Ireland, as well as representatives from the Department of Health and WHO. The views presented reflect consensus of those participating who have had direct experience of ITU treatment of H1N1 patients in the current pandemic and, although verified as far as possible, the opinions are clearly those of the individual teleconference participants. The HPA considered it to be useful to facilitate these telephone conferences and with the Royal College of Anaesthetists is pleased to have the opportunity share some of the outcomes.

PATIENT PRESENTATION

- Most have a history of flu-like illness (pyrexia, tachypnoea) but this may be mild
- Some may deteriorate rapidly or present *in extremis*.
- Although most have respiratory symptoms, some have signs of dysfunction in other systems (e.g. nausea, vomiting, diarrhoea, abdominal pain, encephalopathy).
- Rarely, patients may present with only abdominal or CNS symptom.
- Initial reports suggest <1% require hospital admission.
- Initial reports suggest that a high proportion (10–25%) of laboratory confirmed, hospitalised cases may require intensive care.
- Cases with asthma, or who are pregnant, or morbidly obese may be more likely to require critical care.
- Despite children having high attack rates, at present the proportion requiring ICU admission is low.

CASE MANAGEMENT

Respiratory

- Rapidly progressive respiratory failure is relatively common preceding ICU admission – therefore it is considered that ward based monitoring must include respiratory rate and SpO₂.
- Use within a hospital of an 'early warning system' of clinical patient observation may help identify deteriorating patients.
- Early intubation seems to improve outcomes; current experience of ITU staff suggests using non-invasive ventilation (NIV) as an interim measure may worsen outcomes however, this has not been used in many patients.
- Viral pneumonitis has been commonly seen in UK patients whilst haemorrhagic pneumonitis has been seen in North America.
- Profound hypoxaemia is common, and is seen in **two settings**:
 - ➔ Many have **normal** compliance. Standard ventilation strategies (high PEEP, or High Frequency Oscillation [HFO]) may cause alveolar over-distension or worsen oxygenation/haemodynamics.
 - ◆ in these patients even moderate pressure IPPV (20/10 cm H₂O) may produce Vt > 700ml.
 - ◆ refractory hypoxaemia may persist for 48–72 hours on antivirals before improving.
 - ➔ In some patients **compliance is decreased** and high PEEP and APRV have shown benefit.
- In profound hypoxaemia management although prone positioning and nitric oxide have also been used the outcomes are unclear.
- HFO has been beneficial in refractory hypoxaemia, but standard non-filtered circuits **may** produce an environmental viral hazard. However potential risks may be minimised by the use of options such as negative pressure rooms, viral filtered circuits and personal protective equipment.¹
- Chest x-ray changes including multi-focal infiltrates, nodular/alveolar opacities, or focal consolidation are reported as helpful.



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- Currently the duration of IPPV is reported to range from 5 to 28 days.
- A small number of individual cases have shown a possible improvement in patient survival with the use of ECMO for refractory hypoxia.

Cardiovascular

- Moderate hypotension is relatively common with predictable increases in cardiac output and decreases in systemic vascular resistance.
- Most patients respond to fluid therapy +/- vasopressor therapy; however, volume expansion should be undertaken with caution as over-hydration seems to worsen outcome and as a result a conservative fluid strategy is recommended.

Renal

- Impairment of renal function is common.
- Renal replacement therapy (RRT) may be required in 10–50% of cases.
- Negative fluid balance by either diuretics or continuous ultrafiltration improves oxygenation in many.

Microbiological

- If H1N1 is suspected arrange appropriate sampling and commence oseltamivir prior to results.
- Until a patient's H1 status is known they should be nursed in isolation where possible.
- Confirmed H1 +ve cases can be nursed in open, cohorted areas.
- Nasal and throat swabs, tracheal aspirates (i.e. NDBL) and blood samples may be considered to be taken from some ventilated ICU patients to monitor CT values and oseltamivir resistance; this should be discussed with the local laboratory beforehand. These investigations may be repeated at the discretion of the treating clinician.
- Concurrent bacterial infection has been reported but in a minority of patients.
- Pneumococcus and group A streptococcus have been isolated.
- Special consideration should be given to secondary staphylococcal infection as this is relatively common in seasonal Flu A. Concern over MRSA & PVL variants has been raised and clinicians should be alert to this possibility.
- Routine protocols for the investigation of conventional pneumonias should be followed.
- In uncomplicated cases, patients no longer need to be isolated if they are symptom free, have completed a course of antivirals and are extubated.
- Some adult patients (critically ill, immunosuppressed or pregnant women) may have prolonged viral shedding. Control measures should be used during the duration of acute illness. Some departments are using PCR as a guide. However, PCR does not translate directly to viable virus.

Anti viral drug therapy

- Oseltamivir absorption appears reasonable even in patients with signs of poor gastric motility, but if compromised parenteral neuraminidase inhibitors are a theoretical option currently being pursued.
- Some units are considering seeking oseltamivir blood levels and further work is needed in this area to assist clinicians.
- The conventional oseltamivir dose is 75mg bd (5 days). Some centres are administering 150mg bd for up to 10 days in the critically ill to attempt to limit the duration of viral shedding, ensure aggressive antiviral treatment and therapeutic levels. This is an unlicensed use but there are no reported safety concerns so far but further work will be needed in this area.
- Oseltamivir schedules exist for those with stable impaired renal function. Studies addressing dosing with acute renal failure and RRT are in progress; updates will be provided when available.
- Ribavirin in combination with oseltamivir has been considered in some severe cases. Concerns exist as it is an off license use and there is little evidence available.

Infection control

- Viral transmission to health care workers has occurred in the UK but not, to date within ICU.
- Appropriate personal protective equipment (PPE) should be used while performing potential aerosol generating procedures (tracheal suctioning, HFOV, bronchoscopy, intubation, tracheostomy, CPR).



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- PPE includes single use protective gloves, gown, eye protection and FFP3 mask.¹
- Any staff requiring FFP3 level mask protection must be fit tested.
- Hand hygiene will play an important role in the decrease of transmission; alcohol hand rub is effective.
- There is no evidence to suggest that the virus strains that cause severe/fatal disease differ from those causing mild influenza like illness. It seems likely that host factors are important in determining the severity of illness.
- Staff should remember that the hospital environment is not the only risk factor for exposure and infection. If there is widespread community transmission occurring, they will continue to be at risk whilst not at work.

PLANNING

- All critical care units should have a detailed surge capacity plan.
- Planning should prepare for moderate numbers of cohorted H1N1 ICU patients as relatively small numbers appear to be hospitalised in the initial phase, hence staff support from other areas may not be available.
- The role of theatre ventilators may be limited, as advanced ventilatory support is often required.
- Availability of advanced ventilatory support and RRT, rather than ICU beds, may be critical choke points.

OTHER

- **Sedation requirements** may be unexpectedly high in some patients, particularly to suppress high ventilatory drive – requirement for neuromuscular blockade is common.

Steroids

- High-dose methylprednisolone and hydrocortisone do not appear to improve outcome.
- In H5N1 (avian flu) they may worsen outcome and increase viral shedding times.
- Intensivists restrict replacement steroid therapy to those with evidence of adrenal suppression.

Myositis

- Myositis is common, and many centres routinely test for CK on admission
- Cardiac myocarditis and pericarditis are relatively uncommon on ECG. Clinically significant abnormalities on echocardiography are rare.

Complications and Autopsy data

- Post mortem evidence may provide clarity to the underlying cause of death and pathogenesis.
- Some centres have reported a high incidence of pulmonary embolism, particularly in the sickest patients and therefore DVT prophylaxis should be considered.
- Some concerns have been raised about pancreatitis; the cause and significance of this is unclear.

REFERENCE

1. *Pandemic influenza infection control guidance for critical care*, DH, April 2008 (available on DH website: www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_084178).



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PANDEMIC H1N1 2009 INFLUENZA – PERSONAL PROTECTIVE EQUIPMENT GUIDANCE

PERSONAL PROTECTIVE EQUIPMENT FOR CARE OF PATIENTS WITH PANDEMIC INFLUENZA*

	Entry to cohorted area but no contact with patients	Close patient contact (within one metre)	Aerosol-generating procedures ^{a,c}
Hand hygiene	✓	✓	✓
Gloves	✗ ^b	✓ ^c	✓
Plastic apron	✗ ^b	✓	✗
Gown	✗	✗ ^{d,e}	✓ ^e
Surgical mask	✓ ^f	✓	✗
FFP 3 respirator	✗	✗	✓
Eye protection	✗	Risk assessment	✓

* Standard Infection control principles apply at all times

- a Where possible, aerosol-generating procedures (A-GPs) should be performed in closed single-patient areas with minimal staff present. (A-GPs include intubation, tracheal suction, tracheostomy care, chest physiotherapy, bronchoscopy, CPR).
- b Gloves and an apron should be worn during certain cleaning procedures (Section 5, *Pandemic influenza infection control guidance for critical care*, available on DH website).
- c Gloves should be worn in accordance with standard infection control principles. If glove supplies become limited or come under pressure, this recommendation may need to be relaxed. Glove use should be prioritised for contact with blood and body fluids, invasive procedures and contact with sterile sites.
- d Consider a gown in place of an apron if extensive soiling of clothing or contact of skin with blood or other body fluids is anticipated (e.g. during intubation or when caring for infants).
- e If non-fluid repellent gowns are used, a plastic apron should be worn underneath.
- f Surgical masks (fluid repellent) are recommended for use at all times in cohorted areas for practical purposes. If mask supplies become limited or come under pressure, then in cohorted areas their use should be limited to close contact with a symptomatic patient (within one metre).

Original table available from: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_084178.

ADDITIONAL NOTES ON RESPIRATORY PROTECTION:

- Current information is that most cases of H1N1v influenza give rise to mild symptoms only.
- Influenza virus excreted by hospital patients is the same as that circulating in the community – it is no more virulent just because the patient is in hospital

The main reasons for respiratory protection for hospital staff are two-fold:

1. A duty of care under COSHH (Health and Safety) to reduce the risk of staff acquiring an infection whilst at work.
2. Attempting to reduce acquisition of influenza whilst in the 'controlled environment of workplace' may reduce the chances of staff developing influenza, and consequently being unavailable for work.

Staff do not need to keep changing masks each time they move away from the cohorted area. However they do need to remove gloves and clean as per standard infection control precautions!



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