Pandemic influenza – how would you and your hospital cope?

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This conference was held at the Royal College of Physicians on 19 September 2006 and was organised in association with the British Thoracic Society

Clin Med 2007;7:76–78

Introduction

Pandemic flu has arrived. Who gets the last intensive care bed? Do you go to work when the schools close? Who needs oseltamivir? Does critical care affect outcome? Will we have protective equipment? Who can be managed at home?

All these issues were raised at the one-day pandemic flu conference held at the Royal College of Physicians (RCP). Over 130 delegates attended the conference to discuss both seasonal and pandemic influenza, and to gain an insight into current plans for dealing with an influenza pandemic. They represented a wide range of backgrounds including critical care, public health, the London Ambulance Service and the Department of Health (DH).

The DH approach to pandemic flu planning is underpinned by the 'precautionary principle' stated by Lindsey Davies that 'it is reasonable to take action in an uncertain environment if the risks of inaction are severe or irreversible and the proposed action is proportionate'.

Jonathan Van Tam of the Health Protection Agency (HPA) Pandemic Influenza Office described pandemic influenza from an epidemiological viewpoint. The most recent influenza pandemic was the 'Hong Kong flu' (H3N2) which began in 1968 and led to 30,000 excess deaths in the UK. Before this, the longest interval between recognised pandemics was 39 years (between 1918 and 1957). There are four prerequisites for a new pandemic to occur, and today three have already been met. Firstly, there is a new influenza A subtype (not to be confused with avian influenza); secondly, this strain can cause significant clinical illness in humans; and thirdly, there is no population immunity to this strain. As yet, the only missing factor is efficient person-to-person spread.

In any future pandemic, successful containment at source (likely to be South East Asia) may be possible through aggressive local measures. Other containment measures, such as restriction of air travel, are unlikely to prevent an outbreak and may delay the peak of a pandemic in the UK by only one to two weeks. Once a pandemic reaches the UK, the cumulative attack rate is likely to be 25–35% of the population.

National pandemic planning is well advanced, and is based upon a combination of experience of seasonal influenza and past pandemics. Wei Shen Lim explained that national strategic plans (UK Flu Pandemic Contingency Plan and HPA Flu Pandemic Contingency Plan) and clinical plans (Clinical Management Guidelines by the British Infection Society/British Thoracic Society/HPA/DH and Infection Control Guidelines by the HPA) are in existence. Local healthcare agencies are encouraged to develop their own operational plans from these. However, there is no separate DH funding for pandemic planning as it is considered to be part of NHS trusts' emergency plans.

Clinical features and management

Mark Woodhead explained that during a pandemic the diagnosis of influenza will be made on clinical grounds and not on widespread application of any rapid diagnostic test. Acute onset of flu-like symptoms, fever and a cough will make a diagnosis of influenza likely. During seasonal flu activity, the likelihood of an accurate diagnosis of influenza with these features is up to 70%. This will probably rise during a pandemic. Most cases will be managed in the community and only patients with complications are likely to be admitted to hospital. The most likely complication is influenza-related pneumonia, which may occur in up to 20% of cases.

John Macfarlane outlined the common complications of seasonal flu, which include acute bronchitis, secondary bacterial pneumonia, ECG changes (T-wave inversion and arrhythmias) and otitis media (mainly in children). Influenza is also likely to lead to exacerbation of pre-existing disease. Primary viral pneumonia is an uncommon complication of seasonal flu but, when it occurs, it can lead to rapid respiratory failure. Other uncommon complications are myositis, myocarditis/pericarditis, encephalitis, Guillain-Barré syndrome and parotitis.

Secondary pulmonary infection (ie influenza-related pneumonia) is likely to be related to infection by *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus* or beta-haemolytic streptococci. Other organisms may rarely be involved. Antibiotic therapy will need to be directed at these organisms, according to national guidelines and local advice. Antibiotics are recommended for all high-risk patients

(those with comorbidity) and for those previously well adults who develop pneumonia. The full clinical guidelines can be found at www.dh.gov.uk/PandemicFlu and are also due to be published in peer-reviewed journals *Thorax*[1] and *Journal of Infection*[2] shortly.

Robert Read explained the principles behind antiviral treatment. The neuraminidase inhibitors, oseltamivir and zanamivir, are likely to be the main choices for antiviral treatment. Oseltamivir is available in oral forms and is therefore the most useful in the general population. Zanamivir must be inhaled and will probably be of limited value. The most common side effect of oseltamivir is nausea (10%) which may be relieved by food. It is licensed for use over the age of twelve months. The benefits may include: reduction of illness duration by an average of 24 hours, less hospitalisation and fewer complications. The current recommendations suggest that in adults a five-day course of oseltamivir should be given within two days of symptom onset in those with an influenza-like illness and a fever over 38°C. The effectiveness of antivirals during an influenza pandemic is uncertain since all clinical trials to date have been undertaken in the context of seasonal flu.

Infection control, transmission and containment

How will we cope with infection control measures? Roger Finch said that influenza viruses have been shown to survive for 24 hours on hard surfaces, for two hours on soft surfaces and for five minutes on hands. They survive in an aerosol for one minute. Infection control will be vital. Droplet and contact transmission are likely to be the major routes of transmission. The incubation period for pandemic flu is likely to be between one and four days. Patients would be likely to be infectious from the onset of symptoms for up to five days in adults and eight days in children. Infectiousness is proportional to symptoms, but infectivity may be reduced by very early treatment with oseltamivir.

Segregation of patients, coupled with education, would be the mainstay of infection control. Restrictions would need to be placed on the movements of staff and visitors. The role of vaccination is at present unclear. Personal protective equipment (PPE) including a combination of masks, respirators, aprons, gloves, gowns and eye protection, would be needed depending on the clinical context.

Critical care

Demand for critical care beds in the event of a pandemic is difficult to predict, but is expected to exceed current capacity. Simon Baudouin suggested that at worst demand may be more than four times the current provision. Multi-organ support may be required in some cases. Paediatric critical care experience in general hospitals may be insufficient as paediatric critical care is now a specialist regional service. There is also likely to be significant risk for carers from aerosol generation so large supplies of PPE would be needed. Stocks may not be sufficient and services may be overwhelmed. There are no plans for this contingency.

Conference programme

Welcome Professor Ian Gilmore, President, Royal College of Physicians (RCP) and Professor John Macfarlane, Chairman, British Thoracic Society (co-organiser)

BACKGROUND TO THE PROBLEM

Introduction Professor Lindsey Davies, National Director of Pandemic Flu Preparedness, Department of Health

Epidemiology and modelling Dr Jonathan Van Tam, Health Protection Agency

Clinical features and complications, based on seasonal flu and previous pandemics Professor Karl Nicholson, University of Leicester

GUIDELINES FOR CLINICAL MANAGEMENT – ASSUMPTIONS, RATIONALE AND RECOMMENDATIONS?

Introduction to the clinical management guidelines – pitfalls to avoid Dr Wei Shen Lim, Nottingham University Hospitals NHS Trust (co-organiser)

Investigation, severity assessment and triage Dr Mark Woodhead, Manchester Royal Infirmary

Managing pneumonia and other complications. Antibiotic strategy Professor John Macfarlane

Role of anti-virals Professor Robert Read, University of Sheffield

INFECTION CONTROL

Infection control: principles of transmission and containment Dr Jonathan Van Tam

Putting it into practice in a hospital Professor Roger Finch, University of Nottingham

PUTTING THE GUIDELINES INTO PRACTICE: OPERATIONAL CONSIDERATIONS

Organising the acute admissions area: use of doctors and other health professionals – who will do what? Dr Paul Jenkins, Norfolk and Norwich University Hospital

Managing critical care facilities Dr Simon Baudouin, Royal Victoria Infirmary, Newcastle upon Tyne

Managing hospital care: a trust's example plan Dr Rodney Burnham, Barking, Havering and Redbridge NHS Trust

Managing the pandemic outside the hospital: a strategic view from outside Mr John Pooley, The London Ambulance Service

ETHICAL CONSIDERATIONS

Rationing overstretched resources: duty of care – where does it stop? Dr Clive Richards, Chair of the Nottingham Hospitals Ethics of Clinical Practice Committee and Professor John Saunders, Chair, RCP Ethical Issues in Medicine Committee

Ethical issues

Clive Richards and John Saunders prompted animated and thought-provoking debate with a discussion of the ethical issues encountered when tackling a pandemic. When there is only one critical care bed left, who will we choose to admit? Will it be the 18 year-old with multi-organ failure or a male smoker aged 60 with chronic obstructive pulmonary disease and mild influenza? How would you explain your decision to the other patient's family? Should we toss a coin? Select on age? Try to calculate a survival estimate? Attempts to develop a process for decision-making would be valuable. These discussions should be open and involve the general public, and clear guidelines should be developed.

Duty of care is another ethical dilemma. Lindsey Davies suggested that a staff absence of 15% could be expected at the height of the pandemic. This may well be an underestimate, and many speakers and delegates felt that 50% may be a more realistic figure. Staff may be ill themselves or may have to care for affected family members. Children may be off school either because parents choose not to send them or because the schools are closed. Some staff members may choose not to take the risk of going to work. Should absent staff be disciplined or conscripted to work? Is it reasonable to demand heroism? Staff would be required to take risks and work extremely hard to cope with the workload and the pressure of covering for absent colleagues. This is not unusual for NHS staff but the circumstances may be extreme. NHS staff are renowned for their dedication, particularly in emergency situations and they should be appreciated and supported.

No conclusions were reached on these issues, but all agree that they need to be discussed in detail well before a pandemic occurs so that an attempt can be made to create appropriate guidelines. The DH has recently set up an Ethics Committee to tackle these issues and provide much needed advice and direction.

Planning for pandemic flu is continuing. We do not yet know which influenza virus subtype will cause the next pandemic nor the severity of illness that will follow. Clinical guidelines are based on assumptions from what is known about seasonal flu and historical knowledge of previous pandemics. We feel that the ethical issues may produce some of the greatest challenges. So, pandemic flu – how would you and your hospital cope?

Recordings of all of the contributions during the day are available from the RCP website www.rcplondon.ac.uk/event/ArchiveEvent/0609pandemicflu.aspx

References

1 *Thorax* 2007;62(Suppl 1):i1–i46.
2 *J Infect* 2006;53(S1):S1–S58.

Resources

Department of Health. Pandemic flu. www.dh.gov.uk/PandemicFlu

Department of Health. *Bird flu and pandemic influenza: what are the risks?* London: DH, 2006. www.dh.gov.uk/cmo