PROVISIONAL GUIDANCE

Managing Outbreaks of Respiratory Illness in Care Homes

30 December 2008

MANAGING OUTBREAKS OF RESPIRATORY ILLNESS IN CARE HOMES

This guidance aims to provide health protection staff and the NHS with evidence-based guidance on the management of outbreaks of acute respiratory illness in care homes. This guidance relates to illnesses which are caused by infectious respiratory pathogens, sharing common modes of transmission. It discusses the generic management of outbreaks of ARI, including initial steps to identify pathogens for the purposes of public health interventions, and the specific management of seasonal influenza outbreaks. Specific guidelines exist for the management of outbreaks of pneumococcal disease, legionella, tuberculosis (TB) and severe acute respiratory syndrome (SARS); guidance on these can be accessed at:

Pneumococcal - http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1226652138810
Legionella - http://www.hpa.org.uk/cdph/issues/CDPHvol5/No2/guidelines1.pdf
TB -. http://www.nice.org.uk/CG033
SARS - http://www.hpa.org.uk/infections/topics_az/SARS/Guidelines.htm
This guidance will not apply to pandemic influenza; advice can be accessed at http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1195733831083?p=1191942171190

BACKGROUND

Acute respiratory illnesses (ARI) can affect people of all ages. However, people living in care homes (who are predominantly older people) can suffer more severe illness and a more rapid deterioration, due to underlying disease, immune senescence, immobility and debility. When people are living in close proximity, infection can spread rapidly and more widely. Staff and visitors moving between residents can exacerbate this situation unless stringent infection control measures are in place. An outbreak of ARI (especially if due to influenza or pneumococcal pneumonia) may cause rapid and significant morbidity and mortality, and should therefore be investigated and managed promptly.

Table 1. Relative frequency of organisms isolated from care home outbreaks

Influenza
Respiratory syncytial virus (RSV)
Parainfluenza
Rhinovirus
S .pneumoniae
H. influenzae
C. pneumoniae
Human metapneumovirus (hMPV)
Coronavirus OC43
B. pertussis

Table 1 is complied following a review of the published accounts of investigated outbreaks, not survey data; the most common causes of outbreaks of ARI in institutions for older people, in order of published frequency, are shown in table 1. The list consists of causal agents derived from published accounts representing a fraction of actual incidents which may be subject to publication bias. When considering possible causes of ARI, the

list in table 1 should only be used as an indicator of the relative frequency with which each individual organism causes outbreaks of ARI.

Outbreaks of ARI are more likely to occur from early autumn through to early spring given the relative predominance of influenza and other respiratory viruses during this time. However, staff should be reminded to be alert to signs and symptoms throughout the year. Influenza outbreaks in care homes may precede influenza activity in the wider community; and hence may occur in the autumn, before immunisation campaigns have been fully implemented, and again in spring as antibody levels in older people decline. Given the reported frequency with which influenza is identified in outbreaks of ARI, a diagnosis of influenza should be considered in an outbreak situation at any time of the year and consideration given to implementing rapid intervention with antivirals if influenza is reasonably suspected.

CASE DEFINITIONS OF ARI

There is a lack of consensus around a definition of an acute respiratory illness because of the nature of the symptoms, the wide range of its causes, and the wide range of illness caused by influenza and other respiratory viruses. The definitions used in different studies have varied according to the setting and the need for sensitivity or specificity. The issue of atypical illness in the elderly is particularly problematic. The definitions proposed below are based on studies carried out in care homes in the UK[1, 2].

In people under 65 years of age

*Oral temperature of 37.8° or more **OR** an acute deterioration in physical or mental ability without other known cause **PLUS***
New onset or acute worsening of one or more respiratory symptoms:

cough (with or without sputum)	*hoarseness*
nasal discharge or congestion	*shortness of breath*
sore throat	*wheezing*
sneezing	*chest pain*

In people 65 years of age and over

*Acute deterioration in physical or mental ability without other known cause **OR** acute onset of weakness **PLUS***
New onset or acute worsening of one or more respiratory symptoms:

cough (with or without sputum)	*hoarseness*
nasal discharge or congestion	*shortness of breath*
sore throat	*wheezing*
sneezing	*chest pain*

DEFINITION OF AN OUTBREAK OF ARI

*Two or more cases (as defined above) arising within the same 48 hour period **OR** three or more cases arising within the same 72 hour period, which meet the same clinical case definition and where an epidemiological link can be established.*

Care homes should be encouraged to report any possible ARI outbreaks as soon as possible to the Health Protection Agency by an agreed local reporting mechanism.

TRANSMISSION DYNAMICS

Respiratory infections are usually spread by close contact through one of four mechanisms:

- **droplet transmission** – coughing, sneezing, or even talking may generate droplets more than 5 microns in size that may cause infection if droplets from an infected person come into contact with the mucous membrane or conjunctiva of a susceptible individual. The size of these droplets means that they do not remain in the air for a distance greater than a metre, so fairly close contact is required for infection to occur.
- **direct contact transmission** – organisms may be passed directly to the hands of a susceptible individual who then transfers the organisms into their nose, mouth or eyes.
- **indirect contact transmission** – can occur when a susceptible individual touches a contaminated object, in the vicinity of an infected person and then transfers the organisms to their mouth, nose or eyes.
- **aerosol transmission** – takes place when droplets less than 5 microns in size are created and remain suspended in the air. This can sometimes occur during medical procedures, such as intubation or chest physiotherapy. These droplets can be dispersed widely by air currents and cause infection if they are inhaled.

Further information about transmission, viral shedding[2], incubation times and the period of communicability for specific diseases in adults is given in appendix 1. It is important to note that the values for children may differ from those for adults.

Viral survival outside a host is another factor to be considered in those diseases where indirect contact is thought to play a role in the transmission of the disease. Environmental cleaning will be an important infection control measure for those organisms that can survive in the environment. The survivability of some common viruses is illustrated in table 2 below.

Table 2: Persistence of viruses on dry inanimate surfaces[4]

Virus	Persistence*
Corona virus (non SARS)	3 hours
Influenza	1-2 days
RSV	Up to 6 hours
Rhinovirus	2 hours – 7 days

*Survival on other materials and the skin is likely to be of shorter duration

PREVENTION

Vaccines are available against both influenza and pneumococcal disease and these can be used to prevent or reduce the likelihood of outbreaks of these diseases and their complications.

Pneumococcal vaccines

The pneumococcal vaccination status of all new residents should be assessed and any unvaccinated resident over the age of 65 or those over 5 and under

65 years of age who are in one of the high-risk groups recommended by the Department of Health, should be offered a single dose of the polysaccharide pneumococcal vaccine when they are admitted. Whilst vaccination on a 'once-only' basis is usually recommended, individuals with splenic dysfunction or with chronic renal disease may require re-vaccination. Detailed advice on the pneumococcal vaccine is in the online edition of "The Green Book"[5].

Influenza vaccines

Unless contraindicated, all residents should be offered an annual influenza vaccine; care homes should aim to ensure that this is completed by the end of October. Employers will also wish to ensure, so far as is reasonably practicable, that care staff directly involved in patient care are offered immunisation as well. New staff or residents who join the home between October and February should be offered influenza vaccine if it is still available.

Studies have shown that influenza outbreaks are less likely to occur in care homes where influenza vaccination rates of 80% or more are achieved[6]. In care homes where influenza vaccine coverage is high, there is a reduction in hospital admissions and deaths from pneumonia or influenza and all-cause mortality may be reduced by up to 60%[7].

Influenza outbreaks can occur in care homes where vaccination coverage in staff is poor, even where coverage amongst residents is very high (85-98%), due to the relatively poor immune response to influenza vaccine in the elderly and less than 100% vaccine efficacy. It is therefore crucial that staff coverage is also high[8,9,10].

Influenza vaccines are of limited use in the control of outbreaks which are already underway, as the time from administration to seroconversion is in the region of 10-14 days. However, there is some evidence to suggest that pneumococcal vaccine may have some added benefit over and above antibiotics. Please refer to the pneumococcal guidance on the HPA web at: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1226652138810

Contraindications to pneumococcal/influenza vaccines are:*

a. *confirmed anaphylactic reaction to a previous dose of vaccine*
b. *confirmed anaphylactic reaction to any component of the vaccine*

For influenza vaccine there is an additional contraindication:

c. *confirmed anaphylactic hypersensitivity to egg products*

*for full advice on contraindications and usage refer to "The Green Book"[5], and consult individual Summaries of Product Characteristics [11].

RECOGNITION

Early recognition of an outbreak of ARI or potential ARI in a care home is important because prompt action is necessary in order to prevent further spread of the illness. Unless testing results are available quickly it is probably inadvisable to wait for microbiological/virological confirmation of an illness before implementing general outbreak control measures (covered below in Outbreak Control). However, microbiological/virological confirmation of the

responsible organism should be ascertained as quickly as possible because acute respiratory infections often share similar clinical features.

Health protection staff in liaison with local NHS/HPA microbiologists/virologists should coordinate the taking of fresh diagnostic specimens from symptomatic residents as soon as possible. Specimens for virological investigations are collected in different containers and media to that of microbiological investigations, it is very important that the appropriate specimens are collected in the correct specimen containers and media. For investigation of an acute respiratory infection, the following specimens may be considered:

- Combined nose/throat swab or a naso-pharyngeal aspirate (NPA) in virus transport medium. Sensitivity is improved if specimens are taken from cases with the most recent onset of symptoms or a number of swabs are taken (up to 5). In certain areas where rapid detection of influenza by immuno-fluorescence is undertaken, NPA is preferable,
- Sputum for culture,
- Legionella and pneumococcal urinary antigens, and;
- Paired sera for, influenza A & B, RSV, mycoplasma, adenovirus, *chlamydia* and *coxiella* species. A plain clotted sample should be taken during the acute illness, followed by a convalescent specimen at least 21 days later.

It will be important for the local virologist and microbiologist to be consulted about any testing that is being considered. Expert advice may also be sought from the Respiratory and Systemic Infections Department and/or the Respiratory Virus Unit at the HPA Centre for Infections.

OUTBREAK CONTROL

In the event of an outbreak, the standard infection control principles that should be in place in all health and care settings should be maintained[12]. In addition, Health Protection Scotland has developed very useful guidance on transmission based precautions that give detailed information and advice on the types of Droplet, Contact and Airborne Precautions[13] that should be implemented when dealing with ARI outbreaks. It is important to remember that these infection control precautions should be the mainstay of the public health response, particularly given the recent emergence of oseltamivir resistant influenza. Specific control measures (outlined below) are additional to the recommended infection control guidance.

The following measures are recommended.

Residents

- New admissions or transfers should be stopped. Whether this is the whole establishment or a unit or wing within it will depend on the feasibility of establishing self-contained areas for symptomatic and exposed residents and the staff caring for them. The length of closure will largely be dependent on the organism responsible but based on the incubation period of influenza, the commonest pathogen, four to five days is recommended

- Enhanced surveillance for further cases should be initiated by way of monitoring of all residents for elevated temperatures and other respiratory symptoms. A Recent Cochrane review recommended early diagnosis on clinical suspicion and early isolation to reduce spread[14]
- If possible, symptomatic residents should be cared for in single rooms. If this is not possible, symptomatic residents should be cared for in areas well away from residents without symptoms. If the design of the care home and the numbers of symptomatic residents involved permits, it is preferable to isolate residents into separate floors or wings of the home. Movement of symptomatic residents should be minimised. If the organism is unknown, assume cases will be infectious for up to 5-7 days following the onset of symptoms* or until full recovered
- Resident's clothes, linen and soft furnishings should be washed on a regular basis and all rooms kept clean. More frequent cleaning of surfaces such as lockers, tables, chairs, televisions and floors may be indicated, especially those located within one metre of a symptomatic patient. Hoists, lifting aids, baths and showers should also be thoroughly cleaned between patients. More advice can be found at http://www.hps.scot.nhs.uk/haiic/ic/guidelinedetail.aspx?id=37889
- Residents should have an adequate supply of tissues, as well as convenient and hygienic methods for disposal. Patients should cover their nose and mouth with disposable single-use tissues when sneezing, coughing, wiping and blowing noses and clean their hands or use handrubs (microbicidal handrubs, particularly alcohol-based) afterwards.
- Depending on the nature of the infection and the impact on those affected, consideration might be given to the use of facemasks by affected residents (if this can be tolerated) when they are within one metre of other individuals (unless microbiologically confirmed to share the same infection)

Staff

- If possible, care home staff should work either with symptomatic or asymptomatic residents (but not both) and this arrangement should be continued for the duration of the outbreak.
- Agency and temporary staff who are exposed during the outbreak should be advised not to work elsewhere (e.g. in a local acute care hospital) until the cause is identified and appropriate advice given.
- Symptomatic staff and visitors should be excluded from the home until no longer symptomatic*. Visiting should be discouraged during an outbreak - consistent with patient welfare.,
- Staff should clean their hands thoroughly with soap and water or a handrub (microbicidal handrubs, particularly alcohol-based) before and after any contact with residents. Consideration should also be given to placing handrub dispensers at the residents' bedsides for use by visitors and staff. A recent Cochrane review highlighted the effectiveness of frequent hand washing to reduce the spread of

* See appendix 1 for periods of communicability which should guide decisions about isolation.

respiratory viruses[14]. It is advisable to recommend carrying out a risk assessment before introducing handrubs into the workplace.

- Staff should wear single use plastic aprons, appropriately worn, when dealing with patients.
- The Cochrane review[14] highlighted the effectiveness of barrier measures such as gloves, gowns and facemasks (the higher the filtration the better) to reduce the spread of respiratory viruses, however much of this was based on studies on SARS so may not be directly relevant to other infections. Any decision about the use of personal protective equipment (PPE) needs to be taken in the light of the organism and the impact on the home. If PPE is used it should be worn and removed correctly.
- More stringent infection control is needed during aerosol generating procedures (such as intubation, airway suction, ventilation, CPR, bronchoscopy and nebulisation). Such procedures should be performed only when necessary and in well ventilated single rooms with the door closed. Numbers of staff exposed should be minimised and FFP3 respirators and eye protection should be used in addition to gowns, gloves and universal precautions.
- Staff, patients and visitors should be encouraged to avoid touching their eyes and nose to minimise the likelihood of infecting themselves from viruses picked up from surfaces or other people.
- Uniforms and other work clothing should be laundered at work if there are facilities for this. If laundered at home the general advice on washing work clothes would apply. Uniforms should never be worn between home and the place of work.
- Clinical waste should be disposed of according to standard infection control principles.
- Depending on the causative organism, there may be a case for staff at risk of complications if infected (eg pregnant or immuno-compromised individuals) to avoid caring for symptomatic patients. A risk assessment will need to be carried out on an incident by incident basis.

SPECIFIC CONTROL MEASURES

Influenza

Specific outbreak control measures are an adjunct to properly implemented infection control precautions; the emergence of influenza (H1N1) virus resistant to oseltamivir has been useful in emphasising this point. The prevalence of antiviral resistance and epidemiology of circulating subtypes will need to be considered when contemplating the use of specific control measures.

If influenza is suspected when community influenza activity is considered likely, then influenza-specific measures should be implemented immediately, in accordance with recommendations from NICE[15,16] :

- *Treatment*: unless contraindicated, oseltamivir or zanamivir should be given to all adult patients, where treatment can be started within 48 hours of onset of symptoms,
- *Prophylaxis*: unless contraindicated, oseltamivir or zanamivir is recommended for all adult residents, whether or not they have been vaccinated, who may have been exposed to the infection through

droplet spread, direct contact or indirect contaminated with fomites. This is recommended where prophylaxis can commence within 48 hours of contact and should continue until at least five days after the recovery of the final patient.

Outside of the periods when national surveillance indicates that influenza virus is circulating generally in the community, prophylaxis should be done only if there is a high level of certainty that the causative agent in a localised outbreak is influenza, usually based on virological evidence of infection with influenza in the index case or cases[16]. The review of influenza treatment is pending, due for release in early 2009, but it is expected that similar conditions will apply outside the influenza season.

In addition to the NICE guidance, the Health Protection Agency recommends:

- In the event of a suspected or confirmed influenza outbreak in a care home, consideration should be given to offering prophylaxis to all care staff as well as other residents. This could offer protection against further nosocomial spread, as well as minimising staff sickness absence associated with influenza[17]
- If intervention with zanamivir or oseltamivir has been instigated in response to an incident where influenza is strongly suspected, but a non-influenza diagnosis is subsequently confirmed, therapy with the either agent should be stopped.

OUTBREAK INVESTIGATION AND MANAGEMENT[18, 19]

- Local Health Protection Units should follow their local outbreak plans and establish an outbreak control team to co-ordinate the management and progress of the outbreak.
- The suggested aims of the outbreaks control team will be to:
    - Establish that there is an outbreak and confirm, if possible a diagnosis
    - Initiate immediate general control measures and agree any specific control measures as necessary eg neuraminidase inhibitors
    - Agree on data collection and analysis
    - Carry out the descriptive epidemiology
    - Agree and coordinate any microbiological or virological testing;
    - Undertake case finding
    - Provide appropriate information to patients and staff
    - Develop a communications strategy with a named lead to manage local communications with Primary Care and others
    - Coordinate and prepare any media response
    - Evaluate the progress of the investigation and be ready to adapt the response appropriately
    - Consideration of the representation on the outbreak control team should reflect the source of the residents and other interested agencies

REPORTING

Outbreaks in care homes caused by influenza may precede influenza activity in the community and thus provide valuable information about the

compatibility of the vaccine and circulating influenza strains. It is recommended that information on any local outbreaks is sent to the epidemiology services section within the Respiratory and Systemic Infections Department at the Health Protection Agency Centre for Infections, Colindale. If possible, it would very useful to have information on the:

- number of residents in the home
- number of residents and staff affected
- residents' vaccination history for the appropriate influenza season
- and a description of the outbreak.

The current outbreak form is available at:
http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1231490117848.
This should be completed and returned to the CfI influenza team at respdcsc@hpa.org.uk as soon as is practicable.

COMMUNICATION & INFORMATION

A key element in any outbreak is the provision of reliable and consistent information and ensuring that it is communicated in an appropriate way. It is therefore essential that one of the outputs of the outbreak meeting is agreement on how staff, patients and their relatives will be given the information they need and that there is an agreed media response.

REFERENCES

1. Harling R, Hayward A, Watson JM**. Implications of the incidence of influenza-like illness in nursing homes for influenza chemoprophylaxis: descriptive study.** *Br Med J* 2004; 329: 663-4

2. Hayward AC, Harling R, Wetten S, Johnson AM, Munro S, Smedley J, Murad S, Watson JM. **Effectiveness of an influenza vaccine programme for care home staff to prevent death, morbidity and health service use among residents: cluster randomised trail.** Br Med J 2006; 333: 1241-4

3. Leekha S, Zitterkopf N, Espy M, et al. **Duration of influenza A virus shedding in hospitalised patients and implications for infection control.** Infection control and hospital epidemiology 2007; 28 (9): 1071-1076

4. Kramer A, Schwebke I, Kampf G. **How long do pathogens persist on inanimate surfaces? A systematic review.** BMC Infectious Diseases 2006; 6: 130

5. **"Immunisation against infectious disease – 'The Green Book'"** http://www.dh.gov.uk/en/Publichealth/Healthprotection/Immunisation/Greenbook/DH_4097254 (Link is broken and that is not the correct title)

6. Arden N, Monto AS, Ohmit SE. **"Vaccine use and the risk of outbreaks in a sample of nursing homes during an influenza epidemic"** American Journal of Public Health 1995; 85 (3), 399 – 401.

7. Jefferson T, Rivetti D, Rivetti A, Rudin M *et al* **"Efficacy and effectiveness of influenza vaccines in elderly people: a systematic review"** The Lancet 1/10/2005; 366, 9492.

8. Bush K, McAnulty J, McPhie K, et al. **Antiviral prophylaxis in the management of an influenza outbreak in an aged care facility**. Communicable Diseases Intelligence 2004; 28 (3): 396-400

9. Monto A, Rotthoff J, Teich E, et al. **Detection and control of influenza outbreaks in well-vaccinated nursing home populations**. Clinical Infectious Diseases 2004; 39: 459-64

10. Shugarman L, Hales C, Setodji C, et al. **The influence of staff and resident immunisation rates on influenza-like illness outbreaks in nursing homes.** Journal of the medical directors association 2006; 7: 562-7

11. www.medicines.org.uk

12. Pratt, R.J., Pellowe, C.M., Loveday, H.P., Robinson, N., Smith, G.W. et al "**The epic Project: Developing National Evidence-based Guidelines for Preventing Healthcare associated Infections**" Journal of Hospital Infection 2001; 47 (supplement): S1-82 at http://www.epic.tvu.ac.uk/index.html

13. **Transmission based precautions (airborne, contact and droplet)** at http://www.hps.scot.nhs.uk/haiic/ic/guidelinedetail.aspx?id=37889

14. Jefferson T, Foxlee R, Del Mar C, Dooley L, Ferroni E, Hewak B, Prabhala A, Nair S, Rivetti A. **Interventions for the interruption or reduction of the spread of respiratory viruses**. *Cochrane Database of Systematic Reviews* 2007, Issue 4.

15. National Institute for Health & Clinical Excellence, **"Guidance on the use of zanamivir, oseltamivir and amantidine for the treatment of influenza: TA 58"** February 2003, NICE, London.

16. National Institute for Health & Clinical Excellence, "**Oseltamivir, amantadine and zanamivir for the prophylaxis of influenza (including a review of NICE technology appraisal guidance 67): TA 158"** September 2008, NICE, London.

17. Hota S, McGeer A. **Antivirals and the control of influenza outbreaks**. Clinical Infectious Diseases 2007; 45: 1362-8

18. Heymann, D.L. (ed.) **"Control of Communicable Diseases Manual (18th edition)"** American Public Health Association, Washington, 2004,

19. Hawker, J., Begg, N., Blair, I., Reintjes, R., & Weinberg, J. **"Communicable Disease Control Handbook"** Blackwell Science, Oxford, 2001.

Appendix 1: Transmission, incubation and communicability of respiratory pathogens[18]

Infection	Reservoir	Dominant modes of transmission	Incubation period	Period of communicability*
Rhinovirus or coronavirus	Human	Respiratory droplets, direct and indirect contact with respiratory secretions.	Between 12 hours and 5 days, more usually around 48 hours.	From up to 1 day before* to 5 days after clinical onset.
Influenza virus	Humans are the primary reservoir for human influenza; birds and mammals are likely sources of new human subtypes for influenza A.	Respiratory droplets, direct and indirect contact with respiratory secretions.	Short, usually 1 to 3 days, but possibly up to 5 days.	From up to 12 hours before* to 3 – 5 days after** clinical onset in adults; up to 7 days in young children and occasionally longer
Streptococcus pneumoniae	Humans – pneumococci are commonly found in the respiratory tracts of healthy people.	Respiratory droplets, direct and indirect contact with respiratory secretions.	Uncertain, but possibly 1 to 3 days.	Until discharges are clear of virulent pneumococci, but 24 - 48 hours if treated with penicillin. Pneumococci remain viable in dried secretions for many months.
Respiratory syncytial virus (RSV)	Human	Respiratory droplets, direct and indirect contact with respiratory secretions.	Between 1 and 8 days, more usually around 48 hours.	From up to 1 day before* to 5 days after clinical onset, occasionally longer in infants – up to 4 weeks.
Parainfluenza virus	Human	Respiratory droplets, direct and indirect contact with respiratory secretions.	Between 12 hours and 7 days, more usually around 48 hours.	From up to 1 day before* to 5 days after clinical onset.

* *Few data exist which convincingly demonstrate that transmission by asymptomatic persons is important in producing additional symptomatic cases*
** *Carriage may last for longer (7 days or possibly more) in older people with comorbidity and severe enough illness to warrant hospitalisation for this long*[19]