Pandemic Influenza – Guidance for Infection Control in BSUH NHS Trust

Pandemic Influenza – Guidance for Infection Control in Brighton & Sussex University Hospital NHS Trust

Contents

1. Terminology

Droplet: Droplets are particles propelled by coughing and sneezing and during the performance of some procedures. They are generally regarded to be larger than 5μm in diameter, although there is no consensus on size. Droplets can be deposited on the conjunctiva or mucous membranes of the nose, mouth or respiratory tract and throughout the environment. However, because of their relatively large size, droplets generally travel only short distances (typically less than one metre) before falling to the ground.

Aerosol: Aerosols are very small particles (typically thought to be less than 5μm in diameter, although there is no consensus on size) that, because of their size, can remain suspended in the air and travel over long distances. Aerosols can be generated by certain medical procedures.

What is the difference between a mask and a respirator?

These two terms are often used interchangeably in the health care setting. However, they are technically different. A mask is a face covering which has no filtering capacity, e.g. the paper surgical mask used in operating theatre. It provides a physical barrier to droplet exposure. A respirator contains a filtering device to filter the inhaled air. If fitted properly, a respirator could significantly reduce exposure to aerosols. Both masks and respirators are useful in the setting of pandemic influenza. There is no specific training requirement for using mask and it is possible to use a respirator as a mask. However, training is required for the proper use of respirators for its defined purpose of reducing aerosol exposure. The questions and answers below are all related to the use of respirators.

2. Key Points

Clinical features of influenza

- The most significant features are rapid onset of cough and fever.
- Headache, sore throat, a runny or stuffy nose, aching muscles and joints, and extreme tiredness are other symptoms.
- People are most infectious soon after they develop symptoms, although typically they can continue to excrete viruses for up to five days (seven days in children).

How influenza is spread

- The virus is transmitted from person to person through close contact. The balance of evidence points to transmission by droplet and through direct and indirect contact as the most important routes.

- Aerosol transmission may occur in certain situations, e.g. during aerosol-generating procedures.

Prevention of influenza transmission

- Transmission of the influenza virus can be prevented through:
    - strict adherence to infection control practices, especially hand hygiene, containment of respiratory secretions and the use of PPE
    - adherence to standard infection control principles and droplet precautions
    - administrative controls such as separation or cohorting of patients with influenza
    - instructing staff members with respiratory symptoms to stay at home and not come in to work
    - restriction of symptomatic visitors
    - environmental cleaning
    - education of staff, patients and visitors.

3. Assumptions concerning infection control in a pandemic

The principles of containment and infection control for pandemic influenza are based on the premise that pandemic influenza has similar properties to seasonal influenza:

- Person to person spread of human influenza viruses is well established.
- The patterns of transmission observed during outbreaks of influenza in healthcare settings suggest that droplets and contact (direct and indirect) are the most important and most likely routes of spread.
- In the case of some pathogens, aerosols generated under specific circumstances may be associated with an increased risk of transmission. While this may be possible for influenza, the general consensus is that droplet and contact transmission are of far greater importance.
- The incubation period of human influenza ranges from one to four days (typically two to three).
- How infectious an individual is depends on how severe their symptoms are; people will be most infectious just after their symptoms start.
- Adults will usually be infectious for up to five days after symptoms begin, although longer periods of virus shedding have been found. Children will usually be infectious for up to seven days, although longer periods of virus shedding have been found in infants and a small proportion of children.
- Virus excretion may be considerably longer in immunocompromised patients.
- Although virus may be recovered from infected people before they show symptoms, there is little published evidence to support person to

person transmission of influenza from a pre-symptomatic individual to a person who does not already have the infection.
- Seasonal influenza viruses can survive on surfaces in the environment, especially hard, non-porous materials such as stainless steel.
- Influenza viruses are easily deactivated by washing with soap and water or alcohol handrub and by cleaning surfaces with normal household detergents and cleaners.

4. Core principles of containment and infection control

- timely recognition of influenza cases
- instructing staff members with respiratory symptoms to stay at home and not come in to work
- segregating staff into those who are dealing with influenza patients and those who are not
- consistently and correctly implementing appropriate infection control precautions to limit transmission (standard infection control principles and droplet precautions)
- using PPE appropriately, according to risk of exposure to the virus
- maintaining separation in space and/or time between influenza and non-influenza patients
- restricting access of ill visitors to the facility and posting pertinent signage in clear and unambiguous language (including in languages other than English)
- environmental cleaning and disinfection
- educating staff, patients and visitors about the transmission and prevention of influenza
- treating patients and staff with antiviral drugs that can reduce infectivity and the duration of illness
- vaccinating patients and staff.

5. Infection Control precautions

5.1 Key points

- Standard infection control principles and droplet precautions must be used where patients have or are suspected of having influenza (refer to infection control policy Section 2 – Principles of Infection prevention and control http://w2ksvr049/InfectionControl/StaffInformationSection/Policies/tabid/73/Default.aspx).

Universal precautions summary: 
2.1%20Universal%20Precautions%20Sun

Protective clothing: 
2.3%20Protective%20Clothing%20July%

Management of Linen: 
2.4%20Linen%2007.pdf

Management of Sharps: 
2%206%20Sharps%20-%20updated%20

- Good hand hygiene among staff and patients is vital for the protection of both parties.
- Good respiratory hygiene is essential.

5.2 Hand hygiene

Hand hygiene is the single most important practice needed to reduce the transmission of infection in healthcare settings and is an essential element of standard infection control principles. In any outbreak of pandemic influenza, strict adherence to hand hygiene recommendations should be enforced.

Patients' hands will be heavily contaminated, because of frequent contact with their nose, mouth and the tissues they have used in respiratory hygiene. Their hands will also make frequent contact with their immediate environment. Therefore good hand hygiene among staff before and after contact with patients or their close environment is vital to protect both themselves and other patients. Good hand hygiene among patients should also be encouraged.

Hand hygiene includes hand washing with soap and water and thorough drying, and the use of alcohol-based products containing an emollient that do not require the use of water. If hands are visibly soiled or contaminated (e.g. with respiratory secretions), they should be washed with soap and water and dried. When an alcohol handrub is used to decontaminate hands, the hands should be free of visible dirt and organic material. The handrub must come into contact with every part of the hand's surface.

Hands must be decontaminated immediately before each and every episode of direct care of or contact with patients and after any activity or contact that potentially results in hands becoming contaminated, including the removal of protective clothing and cleaning of equipment. Hands should be decontaminated between caring for different patients and between different care activities for the same patient, even if gloves have been worn. After hand washing, paper towels should be used to dry the hands thoroughly and should then be discarded in the nearest waste bin.

Alcohol handrub must be available at the point of use (e.g. at patients' beds, in examination rooms and on lockers) where a risk assessment has deemed it safe to do so. In certain areas, e.g. paediatrics, alcohol hand rubs that can be carried by staff should be used.

All staff, patients and visitors should clean their hands when entering and leaving areas where care is delivered with either soap and water followed by drying or alcohol handrub.

5.3 Placement of patients within a facility

- Ideally, patients with influenza should be placed in single rooms, but during a pandemic this will not be possible. Therefore, patients should be 'cohorted' (grouped together with other patients who have influenza and no other infection) in a segregated area.
- In all healthcare settings, patients with symptoms of influenza should be segregated from non-influenza patients as rapidly as possible.
- Whenever possible different teams of staff should care for influenza and non-influenza patients.
- Patients with influenza should be managed separately until they are discharged.
- Where patients are cohorted on the basis of epidemiological and clinical information rather than on laboratory-confirmed diagnosis, beds should be at least one metre apart.
- Special room ventilation is not necessary, and the doors of segregated areas can remain open (unless a patient is being isolated for another reason in addition to influenza that requires the doors to be shut).

5.4 Fluid repellent surgical masks

All surgical masks should be fluid repellent. Staff are to wear a surgical mask when entering either an isolation facility or cohorted areas containing pandemic flu patients.

5.5 Transport of patients

- The movement and transport of patients from their rooms or the cohorted area should be limited to essential purposes only.
- If transport or movement is necessary, the dispersal of droplets from spontaneously breathing patients should be minimised by masking them, if possible. The surgical mask should be worn during transport until the patient returns to the segregated area.
- If a surgical mask cannot be tolerated by the patient, then good respiratory hygiene should be encouraged – see section 5.7 below.

5.6 Duration of isolation precautions

Infection control precautions for each patient should be implemented on the patient's admission and be continued for the duration of the illness.

5.7 Managing coughing and sneezing

- Cover nose and mouth with disposable single-use tissues when sneezing, coughing or wiping and blowing noses.
- Dispose of used tissues promptly in the nearest waste bin.
- Wash hands after coughing, sneezing, using tissues or contact with respiratory secretions and contaminated objects.
- Keep hands away from the eyes, mouth and nose.
- Some patients (e.g. older people and children) may need assistance with containment of respiratory secretions; those who are immobile will need a receptacle (such as a plastic bag) readily at hand for immediate disposal of tissues and a supply of hand wipes and tissues.
- Where possible, in common waiting areas or during transport (e.g. from the community to an acute hospital or from one area of the hospital to another), coughing or sneezing patients should wear surgical masks to assist in the containment of respiratory secretions and to reduce environmental contamination.

5.8 Personal Protective Equipment (PPE)

PPE is worn to protect staff from contamination with body fluids and to reduce the risk of transmission of influenza between patients and staff and from one patient to another. Appropriate PPE for staff who care for patients with pandemic influenza is summarised in Table 1.

Care must be taken to ensure that PPE is worn and removed correctly in order to avoid inadvertent contamination (see section 5.12 for guidance on putting on and removing PPE). All staff must remove contaminated clothing –

surgical masks or respirators being removed last – and dispose of it appropriately in clinical waste before leaving a patient care area.

Table 1: Personal protective equipment for staff who care for patients with pandemic influenza

	Entry to cohorted area but no contact with patients	Close patient contact within one metre	Aerosol generating procedure – see section 5.9
Hand hygiene – before & after contact	**Yes**	**Yes**	**Yes**
Gloves	**No – gloves to worn for certain cleaning procedures (housekeeping)**	**Yes**	**Yes**
Plastic apron	**No**	**Yes**	**N0 – Wear fluid repellent gown**
Fluid repellent gown	**No**	**No – unless risk assessment identifies likelihood of splashes**	**Yes**
Surgical mask	**Yes**	**Yes**	**No – wear FFP3 reusable respirator**
FFP3 reusable respirator – See section 5.10	**No**	**No**	**Yes**
Eye protection - Box 50 order code BTP012 (Shermond)	**No**	**No – unless risk assessment identifies likelihood of splashes to face**	**Yes**

5.9 Aerosol generating procedures

Several medical procedures have been reported to generate aerosols, and it has been suggested that some of these are associated with an increased risk of pathogen transmission. However, the risk associated with many aerosol-generating procedures is not yet well defined, and the understanding of the aerobiology involved in such procedures may change as further studies in this area are carried out. In a recent (2007) revised World Health Organization (WHO) document, *Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care*, based on epidemiological studies on tuberculosis (TB) and/or SARS, the following aerosol-generating procedures were considered to be associated with a

documented increase in risk of pathogen transmission in patients with acute respiratory disease:

- intubation and related procedures, e.g. manual ventilation and suctioning
- cardiopulmonary resuscitation
- bronchoscopy
- surgery and post-mortem procedures in which high-speed devices are used.

The authors of the WHO document make the comment that there are other procedures that **may** be associated with an increased risk of pathogen transmission but that some of the studies have methodological flaws that preclude using their conclusions to make recommendations. They categorise these as procedures with only a 'controversial/possible' increase in risk of respiratory pathogen transmission. The 'controversial/possible' procedures specified by WHO are:

- non-invasive positive pressure ventilation
- high-frequency oscillating ventilation
- nebulisation.

Only essential aerosol-generating procedures should be carried out and only those healthcare workers who are needed to perform the procedure should be present in the immediate vicinity. Although the preferred option would be to perform any potential aerosol-generating procedures in side rooms with the doors shut (or in other closed single-patient areas), it is acknowledged that owing to urgency or limitation of such areas this will generally not be achievable during a pandemic. It is therefore recommended that other components of the infection control guidance are strictly adhered to in order to reduce the risk of disease transmission.

A fluid repellent gown, gloves and eye protection must be worn during such procedures. An FFP3 reusable respirator should be worn for:

- intubation and related procedures, e.g. manual ventilation and suctioning cardiopulmonary resuscitation
- bronchoscopy.

The inclusion by WHO of surgery with high-speed devices as an aerosol-generating procedure is extrapolated from a report of TB transmission after the use of a high-speed saw during the post-mortem examination of a patient with lung and bone marrow TB. Individual risk assessments should be used to select appropriate respiratory protection in surgery where high-speed devices are used. Although not directly relevant to the critical care setting, for post-mortem examinations Health and Safety Executive (HSE) advice stipulates the use of a powered respirator when high-speed devices are used.

For procedures with only a 'controversial/possible' increase in risk of pathogen transmission, use of an FFP3 reusable respirator instead of a surgical mask may be considered prudent until data are available that allow better assessment of the risks associated with different procedures.

Almost all aerosol-generating procedures will also generate copious splashes and droplets. It is important that standard infection control principles and droplet precautions are adhered to at all times for all close patient contact.

5.10 FFP3 reusable respirator for pandemic flu (3M type 7500 silicone face-piece with P3 filters)

A FFP3 respirator is to be worn for aerosol generating procedures carried out on patients suspected to have pandemic flu. For further detail see section 5.9.

During the pandemic influenza outbreak a reusable respirator will be used rather than the single use disposable respirators!

All staff who are required to wear a FFP3 respirator must under-go qualitative face fit testing by a BSUH Key position holder.

Key position holders across the Trust will be competent to cascade training in the fitting and use of the respirator to all those staff that need to wear one. Other key messages about pandemic flu will also be given. See section 7.

The key position holders are as follows:

N Lentner to insert

Decontaminating the reusable respirator
As the influenza virus is easily destroyed, we recommend that respirators including filters should be cleaned after use with a detergent wipe. These should be available in all clinical areas. The filter should be kept dry all the times. It is therefore important **NOT** to immerse the respirator into water with the filters in place.

- This procedure is to be carried out wearing gloves
- Take a detergent wipe and wipe over the filters, front of respirator and straps
- Remove filters and thoroughly clean all areas with a detergent wipe. Ensuring detergent does not come into contact with the inside filter (this will damage it). Dry the filters with a paper towel and place in the storage box
- Remove plastic front piece and thoroughly clean front piece and straps with a detergent wipe. Dry with paper towels and store in box

- Thoroughly clean the mouth-piece with a detergent wipe, dry with paper towels and store in box.
- At the end of each shift or if the respirator is soiled with body fluids wash the front and mouth under running water while cleaning with a detergent wipe. DO NOT PUT THE FILTERS UNDER RUNNING WATER – THIS WIL DAMAGE THEM.
- Remove gloves, discard into clinical waste
- Decontaminate hands

Length of life of the filters
As long as the filters are kept dry throughout its use, it is expected that the filters will last for several months, enough to cover the expected duration of an influenza pandemic.

Storage of the reusable respirator
The stockpile of reusable respirators with P3 filters are currently held in ?? At UK alert level 1 (pandemic influenza cases outside the UK) these will be distributed to the Key position holders for allocation following fit check/testing. On receiving the respirator these must be labelled (e.g. with your name written on the filter cartridge) and kept either on person if working in a high risk environment or stored in your locker (if you have one).

Patients and respirators
Patients do not need to wear a respirator if isolated or cohorted in a clinical area. However a patient with influenza must wear a surgical mask when being transported from one department to the next, or in situations where it is not yet possible to isolate and others may be put at risk.

Visitors and respirators
Visitors will be required to wear a normal surgical mask when visiting patients, but not a respirator.

Does the user need to wear a respirator at work all the time during an influenza pandemic?
No, except in a critical care area when in the bed space. The main function of the respirator is to protect against aerosol exposure. Pandemic influenza infection control guidance from the Department of Health has recommended the use of surgical mask when working in clinical areas in the absence of aerosol generating procedures. While it is possible to use the respirator as a mask, a surgical mask would be more comfortable for prolonged use. It is not necessary to wear either a mask or a respirator in non-clinical areas, as there is little evidence to support their routine use in such context.

Can the respirator be used outside of pandemic?
No. The reusable respirator with P3 filters is only to be used during influenza Pandemic or outbreaks of other highly infectious respiratory viruses such as

SARS. An FFP3 **disposable** respirator should be used for management of patients with open tuberculosis.

Can I travel home with a respirator?
It is recommended that the respirator should not be removed from the Trust premises. It will be the user's responsibility to ensure that it is kept safe during the pandemic and available for use when working in the clinical areas.

Loss of the respirator
If the respirator is lost or stolen, the user will be required to use a surgical mask as recommended by the Department of Health guidelines. Due to the high demand of the respirator during pandemic, we cannot guarantee that a replacement respirator will be available.

5.11 Eye protection

Eye protection should be considered when there is a risk of contamination of the eyes by splashes and droplets, e.g. by blood, body fluids, secretions or excretions. The risk to healthcare workers from patients with influenza is from droplets from their coughs and sneezes or splashes produced during some procedures. Individual risk assessments should be carried out at the time of providing care to patients to identify those at risk and decide on reasonable precautions to reduce the risk, e.g. by keeping the number of staff to a minimum and requiring that those who are in close contact with the patient, protect their eyes.

Eye protection should always be worn during aerosol-generating procedures. This requirement extends to all those present in the room during a procedure that has the potential to produce an aerosol (see section 5.9)
Eye protection can be achieved by using any one of:

- a surgical mask with integrated visor
- a full-face visor
- polycarbonate safety spectacles or equivalent.

Disposable single-use eye protection is recommended – Box 50 order code BTP012 (Shermond)

Non-disposable eye protection (e.g. polycarbonate safety spectacles issued to staff as personal equipment on a long-term basis) poses a potential infection risk. It is important that any such items are decontaminated after each use by using agents recommended by the manufacturer.

5.12 Putting on and removing PPE

The level of PPE used will vary according to the procedure being carried out, and not all items of PPE will always be required. Standard infection control principles apply at all times.

Putting on PPE

Healthcare workers should put on PPE before they enter a single room or cohorted area (see section 5.8). The order given here for putting on PPE is practical, but the order for putting it on is less critical than the order of removal.

1) Gown (or apron if it is not an aerosol-generating procedure)

- Fully cover the torso from the neck to the knees and the arms to the end of the wrists, and wrap around the back.
- Fasten at back of neck and waist.

2) Surgical mask (or FFP3 respirator if it is an aerosol-generating procedure – see section 5.9)

- Remove spectacles if spectacle wearer
- Secure ties or elastic bands at middle of head and neck.
- Fit flexible band to nose bridge.
- Fit snug to face and below chin.
- Fit check the respirator.
- Put spectacles on if spectacle wearer

3) Disposable single-use eye protection (in aerosol-generating procedures and as appropriate after risk assessment) – BTP012

- Place over face and eyes and adjust to fit.

4) Disposable gloves

- Extend to cover wrist of gown if a gown is worn.

Removing PPE

Healthcare workers should remove PPE upon leaving the room or cohorted area (see section 5.8) in an order that minimises the potential for cross-contamination. If a single room has been used for an aerosol-generating procedure, those involved in the procedure should, **before** leaving the room, remove their gloves, gown and eye goggles (in that order) and dispose of them as clinical waste. **After** they leave the room they can remove the

respirator and decontaminate it as detailed in section 5.10. Hand hygiene should be performed after all PPE has been removed. The order for removing PPE is important to reduce cross-contamination. The order outlined as follows always applies, even if not all items of PPE have been used.

1) Gloves
Assume that the outside of the glove is contaminated.

- Grasp the outside of the glove with the opposite gloved hand; peel off.
- Hold the removed glove in the gloved hand.
- Slide the fingers of the ungloved hand under the remaining glove at the wrist.
- Peel off second glove over first glove.
- Discard appropriately into clinical waste.
- **Decontaminate hands**

2 Gown or apron
Assume that the front and sleeves of the gown or apron are contaminated.

- Unfasten or break the ties.
- Pull the gown or apron away from the neck and shoulders, touching the inside of the gown only.
- Turn the gown inside out.
- Fold or roll it into a bundle and discard appropriately.
- **Decontaminate hands**

3 Goggles or face shield
Assume that the outside of the goggles or face shield is contaminated.

- To remove, handle by the head band or ear pieces.
- Discard appropriately into clinical waste.
- **Decontaminate hands**

4a Respirator or surgical mask removal for non-spectacle wearers
Assume that the front of the respirator or surgical mask is contaminated.

- **Ensure hands are decontaminated**
- Put on gloves **if removing the reusable respirator** (not necessary for the surgical mask)
- Untie or break the bottom ties, followed by the top ties or elastic, and remove the respirator or mask by handling the ties only.
- Discard the surgical mask appropriately into clinical waste.
- Decontaminate and store the re-usable respirator
- Remove gloves
- Decontaminate hands

4b Respirator or surgical mask removal spectacle wearers
Assume that the front of the respirator or surgical mask is contaminated.

- **Ensure hands are decontaminated**
- Remove spectacles and store safely to one side
- Put on gloves **if removing the reusable respirator** (not necessary for the surgical mask)
- Untie or break the bottom ties, followed by the top ties or elastic, and remove the respirator or mask by handling the ties only.
- Discard the surgical mask appropriately into clinical waste.
- Place respirator in decontamination area
- Remove gloves
- Decontaminate hands
- Put on spectacles
- Put on gloves
- Decontaminate and store the re-usable respirator
- Remove gloves
- Decontaminate hands

Perform hand hygiene immediately after removing all PPE.

Decontaminating the respirator

The pandemic influenza virus is easily destroyed by cleaning with detergent

- This procedure is to be carried out wearing gloves
- Take a detergent wipe and wipe over the filters, front of respirator and straps
- Remove filters and thoroughly clean all areas with a detergent wipe. Ensuring detergent does not come into contact with the inside filter (this will damage it). Dry the filters with a paper towel and place in the storage box
- Remove plastic front piece and thoroughly clean front piece and straps with a detergent wipe. Dry with paper towels and store in box
- Thoroughly clean the mouth-piece with a detergent wipe, dry with paper towels and store in box.
- At the end of each shift wash the front and mouth under running water while cleaning with a detergent wipe. DO NOT PUT THE FILTERS UNDER RUNNING WATER – THIS WIL DAMAGE THEM.
- Remove gloves, discard into clinical waste
- Decontaminate hands

5.13 Infection Control - Critical care areas

Respiratory care issues

Critical care settings can present some situations that may pose an increased risk of potential exposure to respiratory secretions. In patients receiving mechanical ventilatory support, pressures within the breathing circuits of ventilated patients are higher than those used for spontaneously breathing patients; high oxygen flow rates may also be required for spontaneously breathing patients who are in a precarious condition, and there exists the possibility that such severely ill patients will have higher viral loads and hence a greater risk of disease transmission. Following initial observation of a number of critical care ventilators and spontaneous breathing circuits, aerobiology expert observations indicated that, in most cases, droplets were more likely to be produced than aerosols (Peter Hoffman, Health Protection Agency, personal communication, 2008).

A number of practical measures can be taken to reduce exposure, such as anticipating those who are likely to require respiratory support, careful preparation for procedures and modifying techniques, such as using deep sedation with or without neuromuscular paralysis for intubation. Procedures such as intubation should be carried out by experienced members of staff so as to reduce as much as possible the time required and the need for multiple attempts.

Respiratory procedures

- Prepare a kit in advance for procedures such as intubation, including all necessary medical equipment.
- Only essential staff should be in a patient's room or bedside area when airway management or cough-inducing activities are being carried out.
- Staff caring for patients in critical care settings will wear PPE as for an aerosol-generating procedure – gloves, gown, disposable eye-wear and a reusable respirator (see section 5.8).

Respiratory equipment

- Disposable patient respiratory equipment must be used wherever possible. Reusable equipment must be decontaminated in accordance with local policy and the manufacturer's guidelines.
- Closed systems should be used wherever possible (e.g. suction).
- All respiratory equipment used on patients, including transport ventilator circuits and manual resuscitation aids, should include a high-efficiency bacterial/viral breathing system filter (BS EN 13328-1).
- Breathing filters should be changed in accordance with the manufacturer's guidelines.
- The ventilatory circuit should not be broken unless absolutely necessary.
- Staff should be alert to the potential for unplanned breathing circuit disruption:
    - breathing circuits should be checked regularly for tightness of fit of component parts

- caution should be exercised when moving or performing other care on patients who are ventilated, so as to minimise the risk of accidental disconnection.

Non-invasive ventilation

The use of non-invasive ventilation (NIV) and the risks it may pose to healthcare workers via aerosol generation were debated during the SARS outbreaks in Canada and Hong Kong. However, this was complicated by other factors including a lack of the use of PPE, and other studies have shown that NIV can be used effectively and safely in such situations if infection control procedures are strictly followed. Although the transmissibility of SARS may not be the same as influenza, general principles of infection control apply to both.

Current suggested best practice for delivery of non-invasive ventilation in pandemic influenza pneumonia*

- Staff must be trained in infection control.
- Staff will wear PPE as for an aerosol-generating procedure – gloves, gown, disposable eye-wear and a reusable respirator (see section 5.8).
- Ideally, patients should be managed in single rooms or, if there is no other option, in cohorted groups.
- A non-vented patient mask or helmet should be used. Although bi-level pressure support NIV (bi-level positive airway pressure or BiPAP) is likely to be the preferred method of NIV support, in certain circumstances continuous positive pressure ventilation may also be used.
- A high-efficiency bacterial/viral breathing system filter (BS EN 13328-1) should be used between the non-vented mask and the expiratory port and at the outlet of the ventilator.
- Expiratory port options include a whisper swivel valve or controlled leak (each with a proximal filter as above). Ideally, expiratory flow should be directed in a single jet away from patients and staff.
- NIV masks should be applied to the patient’s face and secured before the ventilator is turned on.
- Ventilators that function with double-hose tubing (an inspiratory and an expiratory limb) may be advantageous.
- The ventilator should be turned off before removal of the close-fitting mask or when lifting the mask away from the face e.g. for mouth care or sips of fluid.
- Water humidification should be avoided.

*Adapted from Simonds AK (ed.). *Non-invasive respiratory support: a practical handbook*, 3rd edition (2007). London: Arnold.

6. Environmental Infection Control

6.1 Key points

- Freshly prepared neutral detergent and warm water should be used for cleaning cohorted patient areas and clinical rooms
- As a minimum, areas used for cohorted patients should be cleaned daily and after patient discharge.
- Domestic staff must be trained in the correct methods of using PPE and the precautions to take when cleaning cohorted areas.
- Dedicated or single-use/disposable equipment should be used where possible.

6.2 Clinical and non-clinical waste

No special procedures beyond those required to conform with standard infection control principles are recommended for handling clinical waste and non-clinical waste that may be contaminated with influenza virus. Waste generated within the clinical setting should be managed safely and effectively, with attention paid to disposal of items that have been contaminated with secretions or sputum (e.g. paper tissues and surgical masks); in addition to other routine and domestic waste management.

Excreted waste such as urine and faeces can be safely disposed of in the sewerage system.

All waste collection bags should be tied and sealed before removal from the patient area. Healthcare staff should wear gloves when handling **all** waste and should perform hand hygiene after removing the gloves.

6.3 Linen and laundry

Linen used during care of patients should be managed safely to reduce the risk of contamination to staff, the environment and patients.
● All used linen from influenza patients is to be placed in a red alginate bag then red plastic ‘outer’ Sunlight laundry bag
● Linen should be bagged at the point of use.
● Linen bags must be closed before removal from the influenza patient care area.
● Gloves and aprons should be worn when handling all contaminated linen.
● Hand hygiene should be performed after removal of gloves that have been in contact with used linen.

In certain settings such as outpatients, paper sheeting is a good alternative to linen for use on patient examination couches. It should be changed after each patient has been examined.

6.4 Staff uniforms

The appropriate use of PPE will protect uniforms from contamination in most circumstances.

● During a pandemic, healthcare workers should not travel to and from work or between remote hospital residences and places of duty in uniform.
● Uniforms should be laundered in a domestic washing machine at the optimum temperature recommended by the detergent manufacturers that is appropriate to the maximum temperature the fabric can tolerate then ironed or tumbled dried.
● Uniforms should be transported home in a tied plastic bag and washed separately from other linen in a load not more than half the machine's capacity, in order to ensure adequate rinsing and dilution.
● Staff who do not normally wear a uniform e.g. medical staff should wear theatre attire when working in pandemic flu areas. During the pandemic phase staff will care for the theatre attire as their own uniform and launder/ transport as detailed above as stocks will be severely limited.

6.5 Crockery and utensils

The combination of hot water and detergent used in dishwashers is sufficient to decontaminate dishes and eating utensils used by patients with influenza. There is no need to use disposable plates and cutlery.

6.6 Environmental cleaning and disinfection

● Freshly prepared neutral detergent and warm water should be used for cleaning the healthcare environment.
● As a minimum, areas used for cohorted patients should be cleaned daily.
● Clinical rooms should be cleaned at least daily and also between clinical sessions for patients with influenza and those for patients not infected with influenza, if the same clinical room is used.
● Frequently touched surfaces such as medical equipment and door handles should be cleaned at least twice daily and when known to be contaminated with secretions, excretions or body fluids.
● Domestic staff should be allocated to specific areas and not moved between influenza and non-influenza areas.
● Domestic staff must be trained in the correct methods of wearing PPE and the precautions to take when cleaning cohorted areas. They should wear gloves and aprons; and when cleaning in the immediate patient environment

in cohorted areas they should wear a surgical mask as well. They may be required to wear a re-usable FFP3 respirator in the critical care setting
● Dedicated or single-use/disposable equipment should be used when possible. Non-disposable equipment should be decontaminated or laundered after use in line with local policy.
● All spillages are to be dealt with immediately as per infection control spillage policy section 4.7: http://w2ksvr049/InfectionControl/Portals/0/4.7%20-%20Spillages%2007.pdf


4.7%20-%20Spillages%2007.pdf

6.7 Equipment used for the care of patients

Effective cleaning of equipment used for patient care is an essential prerequisite to both disinfection and sterilisation. The following standard practices for handling and reprocessing used and soiled patient care equipment, including re-usable medical devices, should be followed in both influenza and non-influenza areas of the Trust:

● Gloves should be worn when handling and transporting used patient care equipment.
● Heavily soiled equipment should be cleaned with neutral detergent and warm water before being removed from the patient's room or consulting room.
● Reusable equipment (e.g. stethoscopes and patient couches in treatment and consulting rooms) must be scrupulously decontaminated between each patient; equipment that is visibly soiled should be cleaned promptly.
● External surfaces of portable equipment for performing radiography and other procedures in the patient's room or consulting room should be cleaned with neutral detergent and warm water upon removal from the room.
In addition to these standard practices, non-critical patient equipment should, whenever possible, be dedicated to the use of influenza patients only.

Use of equipment that re circulates air (such as fans) should be avoided.

6.7 Furnishings

All non-essential furniture, especially soft furnishings, should be removed from reception and waiting areas in the Trust.
The remaining furniture should be easy to clean and should not conceal or retain dirt and moisture. Toys, books, newspapers and magazines should be removed from the waiting and other areas.

7. Training

Key position holders in the Trust will be qualified to undertake face fit testing for the reusable FFP3 respirator (section 5.10). These key position trainers will also cascade training to staff that will include:

- symptoms of influenza
- transmission routes of influenza and their relevance to control measures
- standard and droplet precautions for all patients with acute febrile respiratory symptoms and the importance of compliance
- environmental infection control measures and the importance of cohorting
- the appropriate use of PPE in different circumstances, ie what to use and when to use it
- how to put on, remove and dispose of PPE correctly
- the need to put on PPE in a patient emergency (e.g. emergency intubation) and the fact that the correct procedures should not be compromised by the need to act quickly in an emergency
- local arrangements for the self-reporting of illness.

Information in the form of leaflets will be available for patients and visitors. Much of the training of staff members will take place **before** the onset of a pandemic. It is important to involve all staff likely to be on the unit, such as domestic staff, and not just clinical staff.

There will be a dedicated place on the intranet for information on pandemic flu.

8 Audit of practices

During the early phases of the flu pandemic there may be opportunity to audit practices in relation to this policy to monitor compliance and influence future planning. This information will also contribute to the debriefing process following the pandemic.

References

Department of Health (2007) Pandemic Influenza: Guidance for infection control in hospitals and primary care settings. London, Department of Health: 01.11.2007

Department of Health (2008) Pandemic Influenza: Guidance for Critical care settings. London: Department of Health: April 2008

World Health Organization. *Infection prevention and control of epidemic- and pandemic-prone acute respiratory diseases in health care* (2007). Available at: www.who.int/csr/resources/publications/WHO_CD_EPR_2007_6/en/index.html