

Interim Infection Prevention and Control
Precautions
for Possible or Confirmed
Middle East Respiratory Syndrome Coronavirus
(MERS-CoV)
and
Avian Influenza A(H7N9)
in Healthcare Settings

20/12/2013

v2.1

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Summary of infection prevention precautions for patients with possible or confirmed Middle East Respiratory Syndrome (MERS-CoV) or avian influenza A(N7H9)

A possible case or a case with a positive laboratory result (preliminary or confirmed) for MERS-CoV or avian influenza A(H7N9):

Standard, droplet and contact precautions with additional precautions for aerosol generating procedures

Standard, airborne and contact precautions for patients who are in an intensive care unit or require aerosol generating procedures on an ongoing basis

***Note:** If a contact of a case with a positive laboratory result (preliminary or confirmed) develops a respiratory tract infection; the above precautions should also be applied.*

1.0 Introduction

This document outlines the infection prevention and control measures required for patients presenting with possible or confirmed Middle East Respiratory Syndrome (MERS-CoV) or influenza A (H7N9) infection in healthcare settings.

Background

Coronavirus

Coronaviruses are enveloped RNA viruses, which can cause infection in both humans and animals. The human coronaviruses mainly infect the upper respiratory and gastrointestinal tracts resulting in mild upper respiratory tract infections (simple colds), and very rarely cause severe disease. Coronaviruses are transmitted between an infected individual and others via respiratory secretions either directly (through droplets from coughing or sneezing) or indirectly (through touching contaminated objects or surfaces or touching/shaking hands).

Novel coronavirus

A new beta virus strain of coronavirus (MERS-CoV) was identified in September 2012. This virus was first identified in the Middle East¹ in individuals with severe acute respiratory illness, some of whom were transferred for care to hospitals in Europe. This type of coronavirus differs from previously identified viruses affecting humans. Specifically, it is also distinct from other coronaviruses such as the SARS-CoV, which caused the 2003 SARS outbreaks.

Refer to http://www.who.int/csr/disease/coronavirus_infections/en/index.html for the latest information on cases and risk assessments.

Influenza

Influenza is an acute contagious respiratory illness caused by infection with an influenza virus. Influenza can occur throughout the year but activity usually peaks in winter. There are three types of influenza with influenza A and influenza B causing the majority of human infections. A third type, influenza C, is rarely reported as a cause of human illness. Influenza viruses can be found in animals (e.g. pigs) and birds (avian).

Avian influenza A(H7N9)

Influenza A H7 viruses normally circulate amongst avian (bird) populations with some variants known to occasionally infect humans. The avian influenza A(H7N9) serotype was first reported to have infected humans in 2013 in China.⁽¹⁾ Refer to http://www.who.int/influenza/human_animal_interface/influenza_h7n9/en/index.html for the latest information on cases and risk assessments.

This guidance is based on current international and expert advice and will be updated as new information is received.

¹ Bahrain, Iraq, Israel, Jordan, Kingdom of Saudi Arabia, Kuwait, Lebanon, Occupied Palestinian territories, Oman, Qatar, Syria, UAE and Yemen

2.0 Case Definitions

2.1 Case definition for Possible or Confirmed MERS-CoV

Refer to [Algorithm for investigation and public health management of possible cases and contacts of severe acute respiratory illness associated with MERS CoV](#) for case definitions.

2.2 Case definition for Avian Influenza A(H7N9)

Refer to [Algorithm for the investigation and management of possible human cases of avian influenza A\(H7N9\), in returning travellers](#) for case definitions.

3.0 Infection Prevention and Control Precautions

3.1 Administration Controls

- Educate healthcare workers (HCWs) on the importance of applying [Standard Precautions](#) to **all patients at all times**
- Facilities should have a respiratory protection programme in place which incorporates education and practical training for HCWs to ensure that FFP 2/3 respirators² are properly fitted when worn, this includes:
 - Fit testing (priority should be given to staff undertaking aerosol generating procedures in the first instance)
 - Undertaking a fit check each time a respirator is worn
 - Preventing self contamination when removing respirators
- Agency and other temporary placement staff must be either included in the facility's respiratory protection programme or have undertaken equivalent training and education prior to placement
- Educate HCWs on the clinical and epidemiological signs of MERS-CoV and avian influenza A(H7N9) and the importance of early recognition and prompt reporting of cases to the local infection prevention and control team and Public Health Department
- Facilities should have local policies/procedures in place for the management of a possible or confirmed MERS-CoV/ avian influenza A(H7N9) case
- Adequate supplies of personal protective equipment (PPE) should be available
- Ensure that mechanical ventilated rooms have been commissioned, are serviced regularly and that there are mechanisms in place to ensure that the ventilation system is functioning correctly
- HCWs should have access to an occupational health team
- Minimise the number of staff caring for the patient with possible or confirmed MERS-CoV/influenza A(H7N9)

² FFP2 or 3 respirators are the same as FFP 2 or 3 masks

- A record of all staff caring for a patient with possible or confirmed MERS-CoV/influenza A(H7N9) must be maintained
- HCWs who provide direct care or examination to a possible or confirmed case should:
 - Self monitor for any respiratory symptoms in the 14 days following last exposure to a case
 - Not come to work if a fever or cough develops and report to the Occupational Health Department

3.2 Respiratory Hygiene and Cough Etiquette

- All individuals (HCWs, patients and visitors) with signs and symptoms of a respiratory infection should apply respiratory hygiene/cough etiquette:
 - Cover their mouth and nose when coughing and sneezing
 - Use disposable tissues, as a source control³ to contain respiratory secretions
 - Dispose of tissues into waste bins immediately after use
 - Perform hand hygiene
- Healthcare facilities should:
 - If possible, accommodate patients who are coughing/sneezing at least one metre (3 feet) away from other patients
 - Offer surgical masks to coughing/sneezing patients and symptomatic accompanying persons when tolerated and appropriate
 - Promote the use of respiratory hygiene/cough etiquette by all HCWs/patients and visitors with an acute respiratory illness including the use of:
 - Patient information leaflets
 - Posters in all departments especially waiting areas (Appendix A)
 - Educate HCWs/patients/visitors on the importance of containing respiratory aerosols and secretions to help prevent the transmission of respiratory illnesses
 - Provide resources for hand hygiene (e.g., alcohol hand rub, hand washing facilities) and respiratory hygiene (e.g., tissues and waste bins) in waiting and communal areas
- Additional precautions when caring for **all** patients with acute respiratory infection
 - In addition to standard precautions all HCWs and visitors should
 - Wear a surgical mask when in close contact (within 1 metre (3 feet)) and on entering the patient's room or cubicle
 - Perform hand hygiene before and after touching a patient and his or her surroundings and after removing the mask

³ Source control: A means of reducing the emission of droplets when a patient with a respiratory infection coughs or sneezes (e.g., covering the mouth and nose, using tissues and wearing surgical masks)

- Refer to the algorithm with infection prevention and control precautions for patients with suspected or known to be infected with an acute infectious respiratory disease in Appendix B

3.3 Hand Hygiene

Hand hygiene is critical measure to prevent cross-infection. Hands should be decontaminated using alcohol hand rub or washed with soap and water if physically dirty:

- Before touching a patient
- Before a clean/aseptic procedure
- After blood and body fluid exposure
- After touching a patient
- After touching the patient's surroundings

3.4 Patient Placement

Emergency Departments without single/airborne isolation rooms must have interim arrangements in place to prioritise transfer of the patient to an appropriate room.

Doors of isolation rooms must remain closed.

Place an isolation sign indicating the type of transmission-based precautions on the door (as per local guidelines), ensuring that patient confidentiality is maintained.

- Place patient in a single room preferably with ante room and en-suite facilities
- Aerosol generating procedures (AGP) should be carried out in a well ventilated room (e.g. mechanically ventilated with 6-12 air changes per hour or naturally ventilated room⁴). Refer to Appendix C for a list of AGP
- Place patients who require intensive care or require AGP on an ongoing basis in an airborne isolation room⁵ if available

3.5 Patient Movement and Transfer

3.6.1 External transfer

- Each case should be discussed with the Infectious Disease Consultant on call in the National Isolation Unit, Mater Hospital.

⁴ In a naturally ventilated room, an open window increases air changes; however, the door must remain closed.

⁵ An airborne isolation room: There are two types of room which are suitable: negative pressure isolation room or a neutral pressure isolation room. (2-4)

- If transfer is required, it is the responsibility of the transferring facility to inform in advance, staff in the receiving facility and ambulance personnel of the precautions required.

3.5.2 Ambulance transfer (Appendix D)

3.5.3 Internal transfer

- Minimise movement of the patient from the single room
- Patient should wear a surgical mask if tolerated when outside their room
- Staff should wear appropriate PPE during transfer (Section 3.6)
- Staff in the receiving departments should be informed of the precautions required prior to the transfer of the patient (e.g. diagnostic departments, operating theatre)
- Avoid holding patients in communal areas
- HCWs carrying out procedures should wear appropriate PPE (Section 3.6)
- Cleaning and decontamination of the room and equipment should be undertaken following the procedure (Section 3.7)

Operating theatre

- The patient should be anaesthetised and recovered in the operating room
- Staff should wear appropriate PPE (Section 3.6)
- Disposable anaesthetic equipment should be used where possible
- The anaesthetic machine must be protected by a filter with viral efficiency to 99.99%.
- Reusable equipment (anaesthetic, instruments etc) should be decontaminated as per manufacturer's instructions
- Operating room should be cleaned and disinfected after use (Section 3.7)
- Operating room should not be used for 15 minutes after the patient leaves (based on a conventional ventilation system with 20 air changes per hour)

Care after death

- Appropriate PPE (Section 3.6) should be worn by all staff handling the remains
- A body bag should be used for transporting the remains
- Autopsy should be undertaken in a facility complying with *HBN 20 Facilities for mortuary and post-mortem services, NHS Estates* (5)
- During autopsy procedures, HCWs should wear the PPE advised for an AGP (Section 3.6 and Appendix C) and comply with *Health and*

Safety Executive, Safe working and the prevention of infection in the mortuary and post-mortem room, 2003 (6)

- Embalming is permitted
- Viewing and touching of remains (provided there is no risk of exposure to leaked body fluids) is permitted once skin cleansing/hygienic preparation is completed

3.6 Personal Protective Equipment (PPE)

The patient should wear a surgical mask when outside their single room and during chest physiotherapy if tolerated.

The selection of PPE is determined by the risk of exposure to blood and body fluids and the type of precautions advised for MERS-CoV and avian influenza A(H7N9):

- Standard, droplet and contact precautions with additional precautions for AGP
- Standard, airborne and contact precautions for patients who are in an intensive care unit or require aerosol generating procedures on an ongoing basis

PPE for standard, droplet and contact precautions:

- Surgical mask, gloves, eye protection and long sleeved fluid repellent gown⁶

PPE for AGP (including within one hour of cessation of the procedure⁷) and for standard, airborne and contact precautions (e.g. ICU)

- FFP2/3 respirator, long sleeved fluid repellent gown, eye protection and gloves⁶

See Appendix C for the list of AGP and Appendix E for donning and removing PPE

HCWs when putting on and removing PPE must:

- Replace if damp, wet or torn
- Put on and remove in the correct sequence (Appendix E)

⁶ The World Health Organization recommends routine use of eye protection for MERS-CoV and avian influenza, and the routine use of gowns for MERS-CoV(7;8)

⁷ This timeframe is based on naturally ventilated room. In a mechanically ventilated room, the timeframe varies depending on the air changes per hour to achieve 99% removal of airborne particles: refer to Appendix B Table B1.0 in Guidelines for Environmental Control in Healthcare Settings for further information.(9)

- Remove and dispose of gloves & apron/gown inside the single room
- Remove and dispose of mask/respirator in the ante room or immediately outside the single room if there is no ante room. Ensure the door is closed.
- Discard masks/respirator as healthcare risk waste
- Discard gloves/aprons/gowns/goggles as healthcare risk waste if contaminated with blood or body fluids
- Decontaminate hands immediately after removing PPE

3.7 Environmental Hygiene

- Only take essential equipment and supplies into the room. Do not stockpile as unused stock will have to be discarded on cessation of additional precautions
- Patient charts/records should not be taken into the isolation room
- The frequency and intensity of cleaning may need to be increased based on the patient's level of hygiene and the level of environmental contamination
- Staff undertaking cleaning procedures should wear appropriate PPE (Section 3.6)

Cleaning and disinfection

Patient's room

- Thoroughly clean the environment and furniture and all patient care equipment daily with a neutral detergent and disinfectant (e.g., hypochlorite solution 1000 ppm) paying special attention to frequently touched sites and equipment close to the patient
- Cleaning and disinfection of the environment on discharge/transfer:
 - Prior to initiating environmental cleaning and disinfection, all privacy, shower and window curtains must be removed and sent for laundering
 - All disposable items including paper towels and toilet paper should be discarded
 - All sterile and non-sterile supplies in the patient's room to be discarded on patient transfer/discharge
- Cutlery and crockery should be washed in a dishwasher or hand washed with liquid detergent and water

Treatment rooms (e.g. X-ray)

- Clean and disinfect the environment and furniture after use with a neutral detergent and disinfectant (e.g., hypochlorite solution 1000 ppm) paying special attention to frequently touched sites (door handles, bed rails etc)
- Medical equipment (Section 3.8)

3.8 Patient Care Equipment/Instruments/Devices

- Dedicate patient care medical devices (e.g., thermometers, sphygmomanometers, stethoscopes, glucometers) to single patient use
- Use disposable equipment whenever possible
- Manufacturer's instructions should be followed for cleaning and disinfecting of reusable medical equipment after use
- Single use items should be disposed of after use
- Respiratory equipment should be protected by a high efficiency filter
- In a patient requiring artificial ventilation:
 - A closed suctioning system should be used
 - Ventilators should be placed on standby when manual 'bagging' is undertaken
 - Water humidification should be avoided and a heat and moisture exchanger should be used where possible

3.9 Visitors

A record of all visitors should be maintained.

Visitors should:

- Be kept to a minimum
- Wear appropriate PPE while in patient's room
- Be educated on:
 - Donning and removing PPE
 - Hand hygiene
 - Respiratory hygiene and cough etiquette

3.10 Laundry and Linen

As per standard precautions all contaminated laundry should be carefully placed in an alginate stitched or water soluble bag and then placed into a laundry bag clearly identified with labels, colour-coding or other methods prior to transport to an approved laundry capable of dealing with contaminated linen

3.11 Management of Waste

- As per standard precautions
- Surgical masks and FFP2/3 respirators should be discarded as healthcare risk waste
- Gloves, aprons/gowns and goggles contaminated with blood and/or body fluids should be discarded as healthcare risk waste

3.12 Management of Sharps, needle Stick injuries (NSI) and Blood and Body Fluid Exposure, Spillages of Blood and Body Fluids and Safe Injection Practices

- As per [Standard Precautions](#).

4.0 Duration of Transmission-based Precautions

The use of laboratory results (respiratory tract samples) to determine duration of transmission–based precautions is not recommended.

Precautions should be maintained until the patient has been asymptomatic for at least 48 hours.

In an ICU setting, determining when symptoms have resolved can be difficult therefore until more information is known, it may be appropriate to maintain additional precautions until the patient is discharged from ICU.



5.0 Reference List

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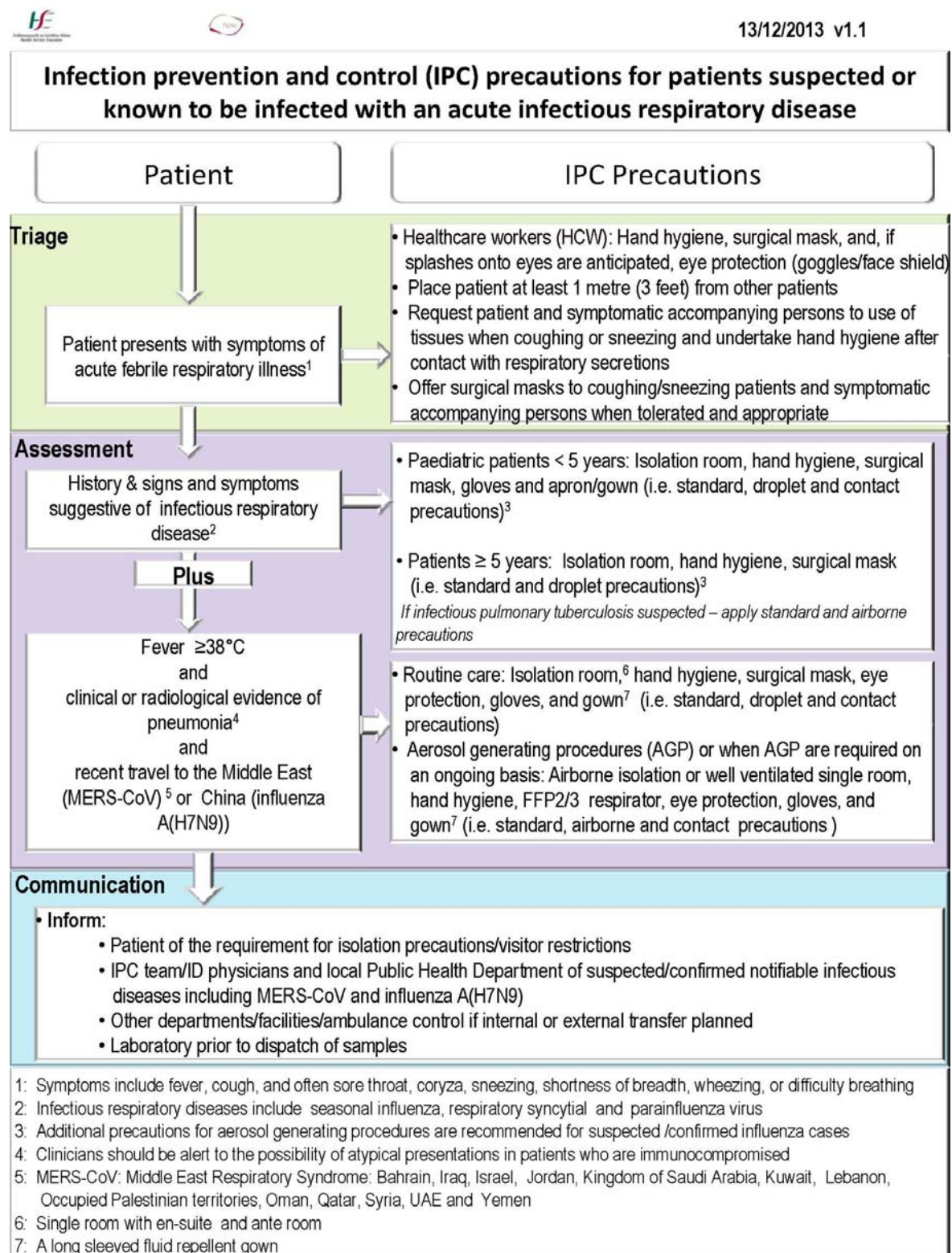
Appendix A: Respiratory Hygiene and Cough Etiquette Poster

COVER UP

COUGHING AND SNEEZING

- 
 - Turn your head away from others
 - Use a tissue to cover your nose and mouth
- 
 - Drop your tissue into a waste bin
- 
 - No tissues? Use your sleeve
- 
 - Clean your hands after discarding tissue using soap and water or alcohol gel for at least 15 seconds

Appendix B: Algorithm for infection prevention and control precautions for patients with suspected or known to be infected with an acute infectious respiratory disease



Appendix C: Aerosol Generating Procedures (AGP)

Based on current recommendations from WHO,⁽⁸⁾ which are derived from a systematic review of the literature,⁽¹⁰⁾ the list of AGP requiring additional precautions have been revised.

The following are AGP which require additional precautions:

- Intubation
 - HCWs performing or exposed to a tracheal intubation were found to be consistently associated with an increased risk of infection (OR 6.6 (95% CI; 2.3,18.9))⁽¹⁰⁾
- Manual ventilation⁸
- Non-invasive ventilation (e.g., BiPAP, BPAP)⁸
- Tracheostomy insertion⁸

Note: Specific infection prevention and control guidance for all bronchoscopy and sputum induction procedures as outlined in the [Guidelines on the Prevention and Control of Tuberculosis in Ireland 2010](#) should be followed⁽⁴⁾

⁸ Tran et al reported that an increased risk of infection was associated with non-invasive ventilation, manual ventilation and tracheostomy; however, these findings were derived from a very limited number of studies with the data not considered sufficiently robust to establish a risk of transmission with any certainty compared to the risk from intubation.

Appendix D Ambulance Transfer

When the Ambulance Control Centre is informed that a patient has possible or confirmed MERS-CoV or avian influenza A (H7N9) the following precautions should be taken by ambulance personnel:

On arrival to the healthcare facility

A. Decontaminate hands (alcohol gel/rub)

B. Personal Protective Equipment (PPE):

- **A patient requiring AGP on an ongoing basis :**
FFP2 or FFP 3 respirator*, gloves, long sleeved fluid repellent gown and goggles
- **A patient not requiring AGP routinely** Surgical mask, eye protection, gloves and long sleeved fluid repellent gown
- **Aerosol generating procedures (AGP)** and while remaining in or entering the patient's room within one hour of cessation of an AGP (Appendix C): FFP2/3 respirator, eye protection and long sleeved fluid repellent gown and gloves

C. Inform the hospital of the admission/transfer of a potentially infectious person

Before leaving the house/healthcare facility

- Request patient to wear a surgical mask (if tolerated) and advise on [Respiratory Hygiene and Cough Etiquette](#)
- A patient with suspected or confirmed MERS-CoV or avian influenza A(H7N9) should not travel with other patients

In ambulance

- Remove gloves, decontaminate hands and put on new gloves before touching the patient and before a clean or aseptic procedure. Wearing gloves does not replace hand hygiene.
- Use single use or single patient use medical equipment where possible
- Use disposable linen if available

Arrival to hospital

- Before the patient leaves the ambulance ensure arrangements are in place for receipt of the patient
- Transfer patient to the care of hospital staff
- After transfer of patient remove PPE (Appendix E)
- Perform hand hygiene

* FFP2 or FFP3 respirator is the same as an FFP2 or FFP3 mask

Before ambulance is used again

- **Cleaning and disinfecting** (PPE as outlined above should be worn while cleaning)
 - Surfaces (stretcher, chair, door handles etc) should be cleaned with a detergent and a hypochlorite solution 1000ppm or equivalent
- **Laundry**
 - Place reusable blankets in an alginate bag, then into a red laundry bag and send for laundering
- **Medical equipment**
 - Follow manufacturer's instructions for cleaning/disinfecting reusable equipment
- **Management of waste**
 - All masks and any waste contaminated with blood or body fluid (including respiratory secretions) should be disposed of as Healthcare Risk waste
- **Management of sharps – per Standard Precautions**
- **Management of spillages of blood and body fluids – per Standard Precautions**

Appendix E Donning and Removing PPE

20/12/2013










Version 1.1



Personal Protective Equipment (PPE) Adapted for MERS-CoV and Influenza A(H7N9)



Correct sequence for putting on and removing PPE to prevent contamination of the face, mucous membranes and clothing.

Putting on PPE		
1. Decontaminate hands		
2. Put on disposable apron/gown		
3. Put on surgical mask or FFP2/3 respirator* as indicated		
Fit Check	For FFP2 or FFP3 respirators:	
	A. Place mask over nose, mouth and chin	
	B. Fit flexible nose piece over nose bridge	
	C. Secure on head with elastic	
	D. Adjust to fit	
	E. Inhale – mask should collapse	
F. Exhale – check for leakage around face		
4. Put on goggles/eye protection (If goggles fog up, the respirator is not fitted correctly, adjust and repeat fit check)		
5. Put on gloves		
Removing PPE		
In patient's room	1. Remove gloves (avoid touching the outside of the gloves)	
	2. Decontaminate hands	
	3. Remove goggles	
	4. Remove gown or apron (avoid touching the front of the gown/apron)	
In ante room or directly outside patient's room. Ensure door is closed	5. Remove mask/respirator by breaking the ties. If ties are elastic grasp and lift ties from behind your head and pull off mask/respirator away from your face. Avoid touching the front of the mask/respirator & use ties to discard	
	6. Discard all masks/respirators (& gloves/aprons/gowns/goggles contaminated with blood or body fluids) as healthcare risk waste	
7. Decontaminate your hands		

*An FFP2/3 respirator is the same as an FFP2/3