



Public Health  
England

Protecting and improving the nation's health

# **Infection control precautions to minimise transmission of acute respiratory tract infections in healthcare settings**

Version 2 - October 2016

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Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health, and are a distinct delivery organisation with operational autonomy to advise and support government, local authorities and the NHS in a professionally independent manner.

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Summary of changes: This updates the version published in August 2015.

This version includes advice on cleaning of re-usable eye protection, for increased safety of the user.

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# Contents

About Public Health England	2
Foreword	4
Part 1: General information	5
1.1 Respiratory infections as a communicable disease	5
1.2 Routes of transmission	5
1.3 Infectious period	6
1.4 Persistence in the environment	6
1.5 Persons most at risk of developing complications	7
1.6 Higher risk environments	7
Part 2: Respiratory precautions	8
2.1 Droplet precautions	8
2.2 Contact precautions	10
2.3 Airborne precautions	11
2.4 Duration for the requirement of transmission-based precautions	12
2.5 Summary	14
References	15

**Separate infection control guidance applies to MERS-CoV, Tuberculosis or human cases of Avian Influenza. Please consult: [www.gov.uk/phe](http://www.gov.uk/phe) for more information.**

## Foreword

Avoiding transmission of acute respiratory infections in healthcare settings can prevent considerable mortality, morbidity and healthcare costs. Patients in healthcare settings, which include acute hospitals, outpatient clinics, A&E departments, specialised units and primary care, are often vulnerable because of age or chronic disease, and may suffer more severe disease or complications from acute respiratory infections.

This document summarises recommendations for the prevention and control of acute respiratory infections in healthcare settings for clinical and public health colleagues. Preventing infection in healthcare settings requires the consistent application of infection control measures by healthcare workers and the involvement of the local infection control team. It also requires efforts to: maximise coverage of seasonal influenza vaccine among vulnerable groups and healthcare workers, and limit the spread of infection by visitors or infected staff, as well as general education and awareness-raising.

The generic information in Part 1 sets the scene, with more specific guidance on transmission-based precautions to interrupt the known routes of transmission of acute respiratory tract infections in Part 2. The focus is on the prevention of common acute respiratory infections rather than dealing with situations such as emerging/pandemic respiratory pathogens (eg MERS-CoV) or with infections such as tuberculosis for which specific guidance is available. Application of the guidance should always be informed by a situation-specific risk assessment.

The information contained within this document is regularly reviewed. We would welcome your feedback.

### Acknowledgements

This document replaces the HPA Version 1 guidance document of the same name, which was reviewed and updated in December 2014 by a PHE review team comprising: Professor Nick Phin, Dr Paul Cleary, Peter Hoffman, Vivien Cleary, Susie Singleton, Dr Gavin Dabrera and Frances Parry-Ford. This has been updated with advice from Dr Jake Dunning and Dr Colin Brown.

The guidance is largely based on guidance developed by Health Protection Scotland and we fully acknowledge the important contribution this has made.

# Part 1: General information

## 1.1 Respiratory infections as a communicable disease

An acute respiratory tract infection (RTI) is an acute infectious process affecting the upper and/or lower airways, causing disease ranging from mild to severe that can spread from person to person. Symptoms can include any of the following: fever, rhinorrhoea (runny nose), sore throat and cough, limb or joint pain, headache, lethargy, chest pain and breathing difficulties.

The most common causes of acute upper RTI are viruses such as rhinoviruses, coronavirus, influenza and respiratory syncytial virus (RSV). Lower respiratory tract infections are commonly caused by bacteria such as *Streptococcus pneumoniae* and *Haemophilus influenzae*. Infections with these organisms often occur secondarily to a viral infection as *S. pneumoniae* and *H. influenzae* are components of the normal upper respiratory tract flora.

Although RTIs can happen at any time of year, they are most common from September to March. Peak activity for RTI caused by influenza occurs during the autumn and winter seasons in temperate regions. In some tropical countries, influenza viruses circulate throughout the year with one or two peaks of activity during rainy seasons. Most deaths associated with influenza in industrialised countries occur among people aged 65 or older.

## 1.2 Routes of transmission

RTIs are spread through one or more of three main routes.

### Droplet transmission

Droplets greater than five microns in size may be generated from the respiratory tract during coughing, sneezing or talking. If droplets from an infected person come into contact with the mucous membranes (mouth or nose) or surface of the eye of a recipient, they can transmit infection. These droplets remain in the air for a short period and travel one to two metres, so physical closeness is required for transmission.

### Airborne transmission

Aerosol generating procedures (AGP) are considered to have a greater likelihood of producing aerosols compared to coughing for instance. Aerosols are smaller than the droplets described above and can remain in the air for longer and, therefore, potentially transmit infection by mucous membrane contact or inhalation.

## Contact transmission

Contact transmission may be direct or indirect. Infectious agents can be inadvertently passed directly from an infected person (for example after coughing into their hands) to a recipient who, in the absence of correct hand hygiene, may then transfer the organism to the mucous membranes of their mouth, nose or eyes.

Indirect contact transmission takes place when a recipient has contact with a contaminated object, such as furniture or equipment that an infected person may have coughed or sneezed on. In the absence of correct hand hygiene, the recipient may transfer organisms from the contaminated object to the mucous membranes of their mouth, nose or eyes.

### 1.3 Infectious period

The infectious period (or period of communicability) is the time period over which an infected person can spread the infection to someone else. This varies by pathogen and by individual.<sup>1,2,3</sup> For many acute respiratory viral infections the infectious period is unknown; for practical purposes it is often assumed to equate to the duration of symptoms. In general, infectiousness is greatest in the early stages of infection. The infectious period for influenza is thought to be from about one day before the onset of symptoms until 3–5 days later. Children, immunocompromised individuals and seriously ill people may remain infectious for a longer period, and action should be considered to minimise prolonged shedding of influenza virus by patients with risk factors. Patients with pertussis infection may be infectious until three weeks after the onset of the paroxysmal phase of the disease.

### 1.4 Persistence in the environment

Experimental studies on the survival of respiratory pathogens suggest that, depending on the organism, the type of surface and the organic material load, they can survive for a limited time in the environment. Evidence shows that influenza viruses can be transferred from surfaces such as glass or plastic to hands up to 24 hours after contamination takes place; from materials such as pyjamas, magazines and tissues influenza viruses may be transferred for up to 2 hours.<sup>4</sup> Hygiene and environmental cleaning are therefore important in helping to control spread. Careful and frequent hand hygiene through hand washing, or the use of alcohol hand gel/rub, is recommended as per the WHO Five Moments.<sup>5</sup>

## 1.5 Persons most at risk of developing complications

Some people are at greater risk of developing more severe disease and complications of RTI (typically pneumonia), including:

- people with
  - chronic lung disease
  - chronic heart disease
  - chronic kidney disease
  - chronic liver disease
  - chronic neurological disease
  - immunosuppression (whether caused by disease or treatment)
  - diabetes mellitus
- pregnant women
- children under five years' old
- people aged 65 years and older
- people who are obese

## 1.6 Higher risk environments

Higher risk environments for transmission of RTIs include clinical settings where aerosol generating procedures (AGPs) are undertaken in open or communal patient areas, and settings caring for patients with severe immunosuppression, such as intensive care units, augmented care settings and neonatal intensive care units.

## Part 2: Respiratory precautions

This section describes precautions that can be taken to reduce the risk of transmitting respiratory infections. These precautions should be used in conjunction with local policies and risk assessments.

All staff, including those who have previously been infected with or vaccinated against a specific respiratory pathogen, should comply with recommended infection control precautions.

Standard infection prevention control precautions are required from all healthcare workers (HCWs) for the care of all patients and patients' environments, to prevent cross-transmission from recognised and unrecognised sources of infection. When standard infection control measures alone are insufficient to interrupt transmission, additional transmission-based precautions are indicated.<sup>†</sup>

Interrupting transmission of a respiratory pathogen requires more than one category of respiratory precautions, including:

- the use of droplet and contact precautions at all times
- the addition of airborne precautions while undertaking an aerosol-generating procedure (AGP)

### 2.1 Droplet precautions

Droplet precautions are designed to minimise transmission of respiratory pathogens from infected patients via droplets to susceptible persons.

#### Patient placement:

- place patient in a single room
- if a single room is not available then cohort patients with other patients with a confirmed RTI caused by the same pathogen, after a documented risk assessment considering the possibility of co-infection with other pathogens
- if single rooms are in short supply and laboratory confirmation is awaited, after a documented risk assessment, it may be feasible to prioritise patients with cough for single room placement
- ensure patients are at least one metre apart from each other and draw privacy curtains or place screens between beds to minimise opportunities for close contact

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<sup>†</sup> Employers are under legal obligation under the Control of Substances Hazardous to Health (COSHH) health regulations to adequately control the risk of exposure to infections where it cannot be prevented. Employees have an obligation to make full and proper use of any control measures, including PPE, provided by their employer. Vaccination cannot be used as a substitution for such controls as it is not always fully effective in all cases.



- facilities such as negative pressure rooms are not necessary to prevent droplet transmission
- display signage to control entry into isolation/cohort areas
- limit the movement of patients outside their room to those necessary for patient management. If patient movement is necessary then the patient should, if possible, wear a surgical face mask to minimise the dispersal of respiratory secretions and reduce environmental contamination
- if the patient is wearing a face mask during transport, then no mask is required by HCWs transporting or accompanying patients for whom droplet precautions are indicated, but careful hand hygiene should be observed; if the patient is unable to wear a mask for any reason, then HCWs transporting or accompanying the patient who will be required to come within two metres of the patient should wear face masks
- if an AGP is required then the patient should be relocated following the advice on airborne precautions in this guidance

### Respiratory hygiene and cough etiquette (Catch it, Bin it, Kill it):

Patients should be instructed to follow the recommendations for respiratory hygiene and cough etiquette:

- use a disposable, single use tissue to cover mouth and nose when coughing, sneezing, wiping or blowing nose
- dispose of tissues promptly in a bin
- practice hand hygiene by washing hands with soap and water, and drying them thoroughly after coughing, sneezing or using tissues

Alcohol gel may be used for hand hygiene if the hands are visibly clean. Some patients, such as older people or children may require assistance to contain respiratory secretions.

### Use of personal protective equipment (PPE):

HCWs assessing or caring for patients with a suspected (clinically diagnosed) or confirmed RTI are advised to wear a surgical face mask when in close contact with the patient (within two metres). Eye protection is advisable where there is assessed to be a risk of eye exposure to infectious sprays. For example, when caring for patients with persistent cough or sneezing. If single-use eye protection is not used, then appropriate procedures should be implemented to safely disinfect reusable eye protection (in accordance with manufacturer's instructions).

When patients with RTI are cohorted in one area and multiple patients require care, it may be more practical to put on a surgical face mask on entry to the area and keep it on for the duration of all care activities, or until the mask requires replacement (when it becomes moist or damaged).

Surgical face masks should be removed and disposed of inside the patient room once the healthcare worker is more than two metres from the patient(s).

## 2.2 Contact precautions

Contact precautions are designed to prevent transmission of infection by contact with the patient or the patient's environment.

### Hand hygiene:

Hand hygiene is part of standard infection control precautions and is the most effective way to prevent transmission by direct contact. As a minimum, hand hygiene must be performed at the WHO Five Moments.

- before touching a patient
- before a clean/aseptic procedure
- after exposure to body fluids
- after touching a patient
- after touching the patient's surroundings

Hand hygiene should also be performed after removing PPE.

Use alcohol hand rub/gel to decontaminate hands which are visibly clean. Use soap and water if hands are visibly soiled.

### Use of PPE:

Plastic apron and gloves should be worn in accordance with standard infection control precautions:

- all staff should wear a plastic apron and gloves
- change plastic apron and gloves and perform hand hygiene between contacts with patients (even when they are in the same room)

### Patient care equipment:

- equipment should as far as possible be allocated to each individual patient or cohort of patients
- where reusable equipment cannot be dedicated to individual patients (eg spirometry equipment), these must be cleaned immediately after patient use and between each patient. Follow local decontamination policy and equipment specific manufacturers' instructions

### Environmental measures:

- ensure that the rooms of patients with infection are cleaned daily, and are prioritised for frequently-touched surface cleaning (eg over-bed tables, lockers, lavatory surfaces in patient bathrooms, door knobs and equipment in the immediate vicinity of the patient) three times a day and immediately if visibly contaminated
- in addition, it is essential that all frequently-touched surfaces and all horizontal surfaces should be decontaminated after any AGP
- keep the patient environment clean and clutter free
- use disposable cleaning materials in accordance with local policy
- carry out terminal cleaning of all isolation/cohort rooms following the local infection prevention and control policy on terminal decontamination

### Linen:

- bag linen following the local policy for safe handling of contaminated linen

## 2.3 Airborne precautions

Airborne precautions are designed to prevent transmission of infectious agents via particles which remain suspended in the air.

The evidence necessary to establish which AGPs are associated with transmission of respiratory pathogens are of variable quality and rigour.<sup>6</sup> From the available literature and incorporating UK expert opinion, the following procedures are considered likely to generate aerosols capable of transmitting respiratory pathogens when undertaken on patients with an RTI:

- intubation, extubation and related procedures; for example, manual ventilation and open suctioning
- cardiopulmonary resuscitation
- bronchoscopy (unless carried out through a closed circuit ventilation system)
- surgery and post-mortem procedures in which high-speed devices are used
- dental procedures
- non-invasive ventilation (NIV) eg bilevel positive airway pressure ventilation (BiPAP)
- continuous positive airway pressure ventilation (CPAP)
- high frequency oscillatory ventilation (HFOV)
- induction of sputum

Certain other procedures/equipment may generate an aerosol from material other than patients' secretions but are NOT considered to represent a significant infectious risk.

Procedures in this category include:

- obtaining diagnostic nose and throat swabs
- administration of pressurised humidified O<sub>2</sub>
- administration of medication via nebulisation

During nebulisation, the aerosol derives from a non-patient source (the fluid in the nebuliser chamber) and does not carry patient-derived viral particles. If a particle in the aerosol coalesces with a contaminated mucous membrane, it will cease to be airborne and therefore will not be part of an aerosol. Staff should use appropriate hand hygiene when helping patients to remove nebulisers and/or oxygen masks.

### Use of PPE:

For all AGPs, an FFP3 respirator (EN149:2001), fluid repellent gown, gloves and eye protection, eg goggles or full face visor, should be worn. There is further advice on the use of FFP3 respirators on the NHS England website.<sup>7</sup> If single-use eye protection is not used, then appropriate procedures should be implemented to safely disinfect re-usable eye protection (in accordance with manufacturer's instructions).

It is a legal requirement that any HCW required to wear an FFP3 respirator should have undertaken respirator fit testing prior to using it. Fit testing should be repeated regularly and whenever a need is identified. For example, if a new product is used or where the users face shape may have changed due to weight loss or gain, major dental work, injuries etc.<sup>‡</sup> In the event of a breach in infection prevention and control procedures, such as incorrectly worn FFP3 respirators during an AGP, staff should be reviewed by Occupational Health.

AGP procedures should only be carried out when essential. Where possible, these procedures should be carried out in well-ventilated single rooms with the doors shut. Only those healthcare workers who are needed to undertake the procedure should be present. A gown, gloves, eye protection and an FFP3 respirator should be worn by those undertaking these procedures and by those in the same room. In post-mortem examinations where high-speed devices are used, the use of a powered respirator can be considered as an alternative to a FFP3 respirator. Visitors to patients ventilated with NIV or HFOV may be exposed to potentially infectious aerosols. The number of such visitors should be limited where possible. Visitors should be made aware of the risks and be offered PPE as recommended for staff.

## 2.4 Duration for the requirement of transmission-based precautions

As a general rule, the duration of isolation precautions for hospitalised patients should be continued for 24 hours after resolution of fever and respiratory symptoms. For prolonged illness with complications such as pneumonia, control measures should be used during the duration of acute illness until symptoms and signs of respiratory disease have resolved. In some circumstances, testing for viral persistence may be helpful to ascertain whether isolation needs to be continued. Individuals considered potentially infectious should be kept away from communal areas in healthcare settings.

Immunosuppressed patients may remain infectious for a longer time period, particularly respiratory viral infections. The decision to discontinue isolation should be based on assessment of the patient's clinical condition and, where available, testing for persistence of virus should be considered.

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‡ <http://www.hse.gov.uk/pUbns/priced/hsg53.pdf>

## 2.5 Summary

These guidelines are recommended by PHE as a comprehensive and resource appropriate approach to reducing the risk of transmission of RTIs in healthcare settings. These guidelines supplement but do not replace a risk assessment by and advice from the local infection prevention and control team. Adherence to these guidelines is particularly important in higher risk settings, when caring for patients at a greater risk of complications from infections or when the infectious agent is unknown. These precautions should be utilised in combination with vaccination of at-risk patients and healthcare workers, where available and appropriate.

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