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- Reasons why isolation and transmission-based precautions are necessary
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- Principles of transmission-based precautions

# A guide to patient isolation and transmission-based precautions

## Key points

Isolating patients with suspected or known infectious agents or diseases can help to reduce the risk of transmission between patients and healthcare workers

Standard infection control precautions should be practised consistently by all staff, in all health and social care settings, at all times

Transmission-based precautions comprise contact, droplet and airborne precautions

Precautions are linked to the mode of spread of the infectious agent and these need to be explored before specific precautions are discussed

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**Abstract** Transmission-based precautions are a necessary part of reducing the risk of infective agents or diseases being transmitted between patients and healthcare workers, and all health and social care staff should be familiar with them. This article explains transmission-based precautions and their potential impact on patients.

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Isolating patients with suspected or known infectious agents or diseases, alongside other infection prevention and control practices, can help to reduce the risk of transmission between patients and healthcare workers (World Health Organization, 2016). It is important to recognise that isolation precautions relate to the micro-organism or infectious agent and not the person, and are linked to its mode of transmission (Wilson, 2019).

## Standard infection control precautions

Standard infection control precautions (SICPs), formerly known as 'standard precautions', are infection prevention and control measures that are essential to reduce the risk of transmission of infectious agents from recognised and unrecognised sources (Department of Health and Social Care et al, 2020). They should be practised consistently by all staff, in all health and social care settings, at all times. SICPs also involve an assessment of risk of those involved, the nature of the care episode or task and the risk of body fluid and blood exposure (Box 1).

## Transmission-based precautions

Transmission-based precautions (TBPs) comprise specific precautions – contact,

droplet and airborne – and usually involve patients being isolated in single rooms. These precautions are linked to the mode of spread of the infectious agent, so that these are explored in more depth before specific precautions are discussed. Some infectious agents/diseases have more than one mode of spread; SARS2-CoV-2 (Covid-19) is spread via contact and droplet routes (DHSC et al, 2020).

## Contact spread

Contact spread is usually via direct contact with the person, the immediate environment and/or the equipment being used. It is the most frequent form of transmission and there are two types: direct and indirect (Health Protection Scotland, 2020). Direct transmission is when the infectious agent is transferred from one person to another, for example, a patient's blood entering a healthcare worker's body through an unprotected break in the skin. Indirect transmission involves transfer through a contaminated object or person. An example would be the transmission of infectious agents from the hands of a healthcare worker who has touched an infected body site on one patient then touched another patient without first performing hand hygiene (National Health and Medical

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Research Council, 2019). Examples of infections and organisms spread by the contact route are Covid-19, MRSA, *Escherichia coli* and *Clostridioides difficile*.

### Droplet and airborne spread

Droplet and airborne precautions are linked to the size of the particles and the distance they can travel; these precautions often include consideration of the area of the respiratory tract they infiltrate.

**Droplet spread.** This concerns large particles – that is >5 microns ( $\mu\text{m}$ ) ( $1\mu\text{m}$  is equivalent to 0.001mm). Individuals must usually be within 1m for droplets containing infectious organisms to spread from the respiratory system of one and make contact with another's respiratory tract, eyes or mouth.

Droplet spread is usually via the upper respiratory tract (nose, nasal passages and pharynx). Droplet infectious agents include mumps, influenza, *Neisseria meningitidis* (meningitis) and Covid-19.

**Airborne spread.** In airborne spread, the particles are smaller ( $\leq 5\mu\text{m}$ ) and can remain suspended in the air for long periods. They tend to be transported by air currents and are created during breathing, talking, coughing and sneezing or by evaporation of larger droplets in conditions of low humidity (NHMRC, 2019).

Small particles can reach the lungs, specifically the alveoli (small sacs responsible for gaseous exchange). Once inside the alveoli the particles can multiply and cause inflammation, which in turn can lead to disease. Agents spread via the airborne route include the bacteria *Mycobacterium tuberculosis* (commonly known as pulmonary TB) and viruses such as measles (HPS, 2020).

### High-consequence infectious diseases

Certain infectious agents, including high-consequence infectious diseases (HCIDs) may be spread via contact, droplet or an airborne route or a combination of any of these. Public Health England (2020) defines an HCID as an acute infectious disease which:

- Typically has a high case-fatality rate;
- May not have effective prophylaxis or treatment;
- Is often difficult to recognise and detect rapidly;
- Is able to spread in the community and within healthcare settings;
- Requires an enhanced individual, population and system response to

### Box 1. Standard infection control precautions

- Hand hygiene
- Personal protective equipment
- Management of the equipment, the environment and linen
- Safe management of blood and bodily fluid spillages
- Safe disposal of sharps and waste
- Occupational safety: prevention and exposure management

Source: Health Protection Scotland (2020)

manage effectively, efficiently and safely. PHE (2020) provides a full list of HCIDs.

### TBPs in practice Contact precautions

Contact precautions are the most common type of TBPs and include:

- A single room with the door closed;
- Personal protective equipment (PPE), which consists of disposable apron and disposable gloves for contact with the patient, the environment and body fluid exposure;
- Hand hygiene before and after removal of PPE and after leaving the single room/environment (HPS, 2020).

### Caring for patients in isolation

It is important that staff are aware of the known or suspected infectious agents involved when considering the care and management of patients nursed in isolation. SICPs should be applied to all patients, regardless of whether they require isolation, as well as the appropriate TBPs.

Single rooms should be en-suite, with a toilet and hand-wash sink as a minimum requirement. Some older hospital buildings may not have en-suite facilities but must have a minimum of a hand-wash basin in the room.

Negative pressure rooms are recommended for patients with, or suspected of having, multidrug-resistant infectious agents/diseases, for example *Mycobacterium tuberculosis* (MDR TB) (National Institute for Health and Care Excellence, 2016). The pressure inside the room is lower than outside, preventing contaminated air from escaping the room (Department of Health, 2013). Negative pressure rooms should always have doors and windows shut.

In certain circumstances when there are insufficient single rooms, and based on a risk assessment and the needs of the local healthcare organisation, it may be necessary to cohort patients in the same area of a

ward or unit. This usually involves patients with the same infectious agent. In the case of Covid-19, for example, patients will be risked assessed depending on the severity of the disease and the nature of the care and interventions required and assigned to a specific area. This may also include risk assessment for the available single rooms. Those requiring aerosol generation procedures (AGPs) will need well-ventilated single rooms to help prevent transmission during and following procedures, due to the length of time the infectious agent may remain airborne (Box 2).

Cleaning of any isolation room or specific cohort area should be undertaken at least daily, referring to local guidelines. Rooms should be as clutter-free as possible to allow thorough cleaning. Equipment should be single-patient and cleaned after each use, or single-use, where possible and disposed of according to local policy. Any equipment that is not suitable for single-patient use should be left in the room, cleaned after each use and decontaminated fully before returning to general use (DHSC et al, 2020).

### Hand hygiene

Transmission of microorganisms by the hands of healthcare workers is the most likely method of contributing to the spread of infections in hospitals (Loveday et al, 2014). Hand hygiene refers to either handwashing or the use of alcohol-based hand rub (ABHR), and hand hygiene is crucial for any of the TBPs (contact, droplet or airborne).

### Personal protective equipment

PPE consists of gloves, aprons and disposable gowns. Respiratory protective equipment (RPE) includes face protection, such as visors, goggles, fluid-repellent surgical face masks and FFP3 respirator masks and respirator hoods.

PPE and RPE protect both healthcare workers and patients (Royal College of Nursing, 2017). Risk assessment is required to ascertain the most appropriate PPE/RPE before any procedure or task. PPE should be stored in a clean, dry area and protected from contamination. It should be available at the point of use, single-use and applied (donned) and removed (doffed) correctly to prevent cross contamination. It should also be disposed of in the correct area and waste stream (HPS, 2020) (Table 1). Specific PPE depends on the task and the type of precautions required.

It is important to remember that gloves are not a substitute for good hand hygiene

(RCN, 2020; Loveday et al, 2014) and can also cause contact dermatitis, especially if overused; nurses should seek advice if they are experiencing skin problems.

### Respiratory protective equipment

RPE consists of an FFP3 respirator or powered respirator with hood and facial protection. It must be considered when a patient is admitted with a known or suspected infectious agent or disease that is spread by the droplet or airborne route.

If droplet precautions are required, contact precautions will automatically be in place. The additional precautions required include a disposable apron or a fluid-resistant disposable gown if an apron is insufficient for the task being undertaken. A fluid-resistant surgical facemask with eye protection or full-face visor will also be required. An FFP3 respirator or powered respirator with hood will be required if AGPs are anticipated as they can produce droplets <math><5\mu\text{m}</math>.

As with droplet precautions, if airborne precautions are required, contact and droplet precautions will already be in place. Additional precautions include a disposable gown/ full fluid-resistant disposable gown, and an FFP3 respirator or powered respirator with hood.

FFP3 masks are designed to fit closely to the face to prevent transmission of particulates via the airborne route. Before using FFP3 masks for the first time, each staff member should have the fit tested, and from then on undertake regular fit checks (HPS, 2020). These masks should always be worn with full-face plastic visors or goggles to protect the eyes.

Staff in primary care/outpatient settings or care homes would not normally be required to wear an FFP3 mask unless performing an AGP, when they should wear a single-use FFP3 respirator or powered respiratory hood alongside face protection. However, it is important to consult local guidelines and for infection prevention and control teams to check on PPE and RPE requirements.

### Psychosocial impact

Patients who are isolated may become anxious, withdrawn and/or depressed, so good communication with both patients and relatives is important to help minimise distress (Wilson, 2019). In a systematic review by Abad et al (2010), it was recognised that isolation has an adverse psychological consequence. Patients can become agitated and sometimes aggressive, which can be misconstrued as being 'difficult'. It

### Box 2. Aerosol-generating procedures

- Intubation, extubation and related procedures
- Tracheotomy/tracheostomy
- Manual ventilation
- Open suctioning
- Bronchoscopy
- Non-invasive ventilation, for example bi-level positive airway pressure and continuous positive airway pressure ventilation
- Surgery and post-mortem procedures using high-speed devices
- High-frequency oscillating ventilation
- High-flow nasal oxygen
- Induction of sputum
- Some dental procedures

Source: DHSC et al (2020)

is important that staff recognise that the behaviours may be linked to isolation (Wilson, 2019). Abad et al (2010) suggest one of the main reasons for anxiety and depression is feeling a loss of control.

Isolation also has a potential effect on care. Patients can be at increased risk of falls and omissions in care, such as infrequent documentation and poor recording of vital signs (Stelfox et al, 2003). Abad et al (2010) found evidence to suggest that health professionals may spend less time with patients in isolation than with other patients. The act of putting on the PPE and other interventions linked to TBPs may be viewed as cumbersome and time-consuming and can detract from the time spent with the patient.

If a patient cannot be isolated in a single room with the door closed due to safeguarding issues, this will need careful consideration and discussions with the infection prevention and control team.

It is also important to note that it is the microorganism(s) that require isolating

and not the person. Care should be taken to ensure the precautions taken are appropriate and patients' needs are taken into account (Wilson, 2019).

### Conclusion

Transmission-based precautions are a necessary part of reducing the risk of transmission of infective agents and diseases to patients and healthcare workers. It is vital that all staff involved in patient care are aware of SIPC, the different routes of transmission and the appropriate TBPs to take. The detrimental psychosocial impact of isolation should not be overlooked by staff caring for patients in these situations. **NT**

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Table 1. Donning and doffing personal protective equipment

Putting on PPE (donning)	Removing PPE (doffing)
<p>After performing hand hygiene, personal protective equipment should be donned in the following order:</p> <ul style="list-style-type: none"> <li>● Apron or gown</li> <li>● Mask</li> <li>● Eye protection (if needed)</li> <li>● Gloves</li> </ul>	<p>Personal protective equipment should be doffed in the following order:</p> <ul style="list-style-type: none"> <li>● Gloves</li> <li>● Apron</li> </ul> <p>(Hand hygiene should be performed after gloves and apron are doffed)</p> <ul style="list-style-type: none"> <li>● Eye protection (if used)</li> <li>● Mask (after leaving the room)</li> </ul> <p>Hand hygiene should be performed again</p>