

Transmission Based Precautions Definitions Literature Review

Executive Summary

Version 1.0

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Introduction

This literature review informs both the standard infection prevention and control precautions (SIPCs) and the transmission-based precautions (TBP) content in the National Infection Prevention and Control Manual (NIPCM) and the Care Home Infection Prevention and Control Manual (CH IPCM):

- [NIPCM Chapter 1 – Standard Infection Prevention and Control Precautions \(SIPCs\)](#)
- [NIPCM Chapter 2 – Transmission Based Precautions \(TBPs\)](#)
- [CH IPCM Chapter 1 - Standard Infection Prevention and Control Precautions](#)
- [CH IPCM Chapter 2 – Transmission Based Precautions \(TBPs\)](#)
- [Appendix 11 - Patient placement considerations and respiratory protection, including R1, R2 and R3 respiratory agents](#)
- [Appendix 16 – Hierarchy of controls](#)

There are three documents to note:

- The literature review which provides a comprehensive systematic review of the evidence
- Considered judgement forms which outline the evidence base and expert opinion used to develop the recommendations and good practice points (GPP) for each literature review research question. Also detailed are the benefits, potential harms, feasibility of implementation, value judgements, intentional vagueness, and exceptions associated with the recommendations and good practice points.
- Evidence tables which detail all the included studies and provide an assessment of the evidence for each research question of the literature review.

Scope

Research questions

There are nine research questions (RQ) in this literature review. New research questions were introduced, including RQs 4, 5, 8 and 9.

- RQ 1 What is the current definition of contact transmission?
- RQ 2 What is the current definition of droplet transmission?
- RQ 3 What is the current definition of airborne transmission?
- RQ 4 How are infectious agents released into the air of the health and care environment from the respiratory tract with consideration of particle size, distance and clearance/fallout time?
- RQ 5 Can person-to-person transmission of infection be described/defined beyond the current categories of contact/droplet and/or airborne?
- RQ 6 What are Transmission Based Precautions (TBPs)?
- RQ 7 When should TBPs be applied?
- RQ 8 Are there reported occurrences of person-to-person infectious agent transmission which do not align with their currently assigned transmission mode(s)?
- RQ 9 What factors should be considered when determining whether to discontinue TBPs?

Change to Practice

This literature review update has resulted in a significant change to the transmission route descriptors within the NIPCM: the historical 'droplet' and 'airborne' transmission route descriptors have been replaced with the new term 'air' transmission. This is in acknowledgement that respiratory particles exist in a continuum of particle sizes that can be found both close to, and at distances from, an infectious source. The working group ascertained that the evidence base is limited but stronger than the evidence on which the historical definitions (droplet and airborne) were based, therefore change was needed. There is no change to the existing contact transmission descriptors.

There is a new GPP that introduces the new 'air' transmission descriptor; air transmission is defined as transmission of infectious agents from one person to another (without touching) via body fluids that travel from the infected person through the air. Infectious agents can be transmitted by splashing or spraying of body fluid particles onto the mucosa and/or inhaling body fluid aerosols (GPP5.1).

There are new GPPs that describe scenarios that present high-risk exposures. GPP4.1 advises that coughing (both natural and procedurally induced on awake patients) should be considered as presenting a higher-risk exposure compared to most other natural respiratory activities. GPP4.2 advises that use of high-speed devices on tissues within the respiratory tract (and extra-pulmonary TB sites) in surgery/ post-mortem and dentistry, should be considered as presenting a high-risk exposure. GPP4.3 advises that respiratory exposure risk increases with proximity and should be considered greatest when within 1 metre (~3 feet) of an individual's airway when delivering care.

A change to practice associated with the above new good practice points is removal of aerosol generating procedures as one of the leading indications for transmission-based precautions. Appendix 16 (AGPs and post-AGP fallow times) has been archived and the term 'aerosol generating procedure' has been removed from guidance. There is no longer a finite list of procedures for which specific precautions have to be applied. Instead, the focus for healthcare workers is now on whether a care procedure presents a high-risk exposure, which the evidence has shown includes coughing (natural or procedurally induced) and use of high-speed devices on the respiratory tract.

Another change to practice that comes with the removal of 'droplet' and 'airborne' descriptors is the determination of TBPs according to the hazard posed by the respiratory infectious agent. GPP7.4 introduces three hazard categories; R1, R2 and R3. [Appendix 11 of the NIPCM](#) now advises healthcare workers to base patient placement decisions and minimum mask selection according to the new R1, R2 and R3 hazard categories.

With the removal of aerosol generating procedures from guidance, there is a change to practice with post-AGP fallow times no longer required. Previously, mathematical modelling was used to develop guidance for fallow times based on the ventilation

within the room and the length of the AGP. This resulted in long fallow times, some as high as 5.5 hours significantly impacting the flow of patients and delivery of clinical care. The patient placement section of the NIPCM now acknowledges the potential respiratory exposure risk to individuals entering a room in which a patient with respiratory infection has just vacated. Mitigations such as a room vacancy period and use of respiratory protection (surgical mask or RPE) may be applied based on the vulnerability of the entering patient and the risk the respiratory pathogen poses. The stage of infection, and whether the vacating occupant still presents a transmission risk, should be considered by the clinical team.

This literature review update has resulted in revision of [Appendix 16 \(hierarchy of controls\)](#). Previously, the appendix advised a risk assessment to determine which clinical areas were considered optimal for placement of service users with transmissible respiratory infection. Areas deemed unsuitable were those that were 'poorly ventilated' (<6 air changes per hour) and overcrowded; RPE was advised for staff treating respiratory patients in these areas. The working group agreed, as per GPP7.3, that room ventilation provision which is insufficient to dilute the infectious particles in the air, taking account of the size and maximum capacity of the room, should be considered higher risk for far-field exposure to transmissible respiratory infectious agents. However, the working group acknowledged that it is not currently possible to define sufficient (or insufficient) dilution for the purposes of infection control; current technical guidance Scottish Health Technical Memorandum (SHTM) 03-01 Part A refers to dilution of airborne contaminants in general, not dilution of infectious airborne contaminants. Consequently, the environmental risk assessment has been removed from [Appendix 16](#). Room ventilation as an indication for RPE selection has been replaced with the introduction of the R1, R2 and R3 hazard categories for respiratory infectious agents, as per [Appendix 11](#).

Change to recommendations (R) and good practice points (GPP)

There are several good practice points that are 'new' in terms of appearing for the first time in this latest literature review update however these are reflective of current practice. GPP7.2 advises that, in addition to the transmission route of the suspected or confirmed infectious agent, several additional factors should be considered when deciding which TBPs should be applied. These include factors associated with the infectious agent (transmissibility, severity of illness, consequences of onward transmission, novel nature), the place (environmental factors), local epidemiology/outbreak data, the presence of other vulnerable service users, the care procedure, service user factors (symptoms, behaviour, ability to comply with IPC), and occupational health related risk.

TBPs should be discontinued when the service user is considered to be no longer infectious (GPP9.1) and when deciding when to discontinue TBPs, the vulnerability of service users in the vicinity should be considered (GPP9.3). The need for continued application of TBPs should be reassessed regularly, as per GPP9.4.

Summary of Recommendations (R) and Good Practice Points (GPP)

Research Question 1: What is the current definition of contact transmission?

This research question aimed to outline how contact transmission is currently described within the literature. It therefore does not have any associated recommendation(s).

Research Question 2: What is the current definition of droplet transmission?

This research question aimed to outline how droplet transmission is currently described within the literature. It therefore does not have any associated recommendation(s).

Research Question 3: What is the current definition of airborne transmission?

This research question aimed to outline how airborne transmission is currently described within the literature. It therefore does not have any associated recommendation(s).

Research Question 4: How are infectious agents released into the air of the health and care environment from the respiratory tract with consideration of particle size, distance and clearance/fallout time?

R4.1 The evidence base demonstrates that the current definitions of 'droplet' and 'airborne' transmission are not sufficiently supported and should be discontinued.

R4.2	Evidence-based definitions should be developed to replace the historical ‘droplet’ and ‘airborne’ descriptors – these are outlined in GPP5.1.
GPP4.1	Coughing (both natural and procedurally induced on awake patients) should be considered as presenting a higher-risk exposure compared to most other natural respiratory activities; risk of exposure increases with proximity.
GPP4.2	Use of high-speed devices on tissues within the respiratory tract (and extra-pulmonary TB sites) in surgery/post-mortem and dentistry, should be considered as presenting a high-risk exposure; risk of exposure increases with proximity.
GPP4.3	Respiratory exposure risk increases with proximity and should be considered greatest when within 1 metre (~3 feet) of an individual’s airway when delivering care.

Research Question 5: Can person-to-person transmission of infection be described/defined beyond the current categories of contact/droplet and/or airborne?

GPP5.1	Person-to-person transmission of infectious agents should be defined by one, or a combination of, the following transmission routes: Air transmission: transmission of infectious agents from one person to another (without touching) via body fluids that travel from the infected person through the air. Infectious agents can be transmitted by splashing or spraying of body fluid particles onto the mucosa and/or inhaling body fluid aerosols. Contact transmission: transmission of infectious agents from one person to another by direct physical contact (direct contact transmission) or indirectly through contact with a contaminated object or surface (indirect contact transmission).
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Research Question 6: What are Transmission Based Precautions (TBPs)?

This research question aimed to outline how transmission-based precautions are currently described within the literature. It therefore does not have any associated recommendation(s).

Research Question 7: When should TBPs be applied?

GPP7.1 Transmission Based Precautions (TBPs) should be implemented in addition to SICPs when an individual is suspected or confirmed to be infected or colonised with an infectious agent.

GPP7.2 In addition to the transmission route of the suspected or confirmed infectious agent, the following factors should be considered when deciding which TBPs should be applied:

- Infectious agent (transmissibility, severity of illness, consequences of onward transmission, novel nature).
- Place (environmental factors)
- Local epidemiology/outbreak data
- Presence of other vulnerable service users
- Procedure
- Service user factors (symptoms, behaviour, ability to comply with IPC).
- Occupational health related risk

GPP7.3 Room ventilation provision which is insufficient to dilute the infectious particles in the air, taking account of the size and maximum capacity of the room, should be considered higher risk for far-field exposure to transmissible respiratory infectious agents.

GPP7.4 For the purposes of transmission-based precautions, respiratory infectious agents should be categorised according to the hazard they pose into the following categories:

- **R1 = respiratory infectious agents that can cause human disease and may be a hazard to employees; they are unlikely to spread to the community and there is usually effective prophylaxis or treatment available.**
- **R2 = respiratory infectious agents that can cause severe human disease and may be a serious hazard to employees; they may spread to the community; but there is usually effective prophylaxis or treatment available.**
- **R3 = respiratory infectious agents that cause severe human disease and are a serious hazard to employees if exposed; they are likely to spread to the community and there is usually no effective prophylaxis or treatment available.**

Research Question 8: Are there reported occurrences of person-to-person infectious agent transmission which do not align with their currently assigned transmission mode(s)?

This research question aimed to identify and describe any reported occurrences of person-to-person infectious agent transmission which do not align with their currently assigned transmission mode(s). There are no associated recommendations or good practice points.

Research Question 9: What factors should be considered when determining whether to discontinue TBPs?

GPP9.1 Transmission Based Precautions (TBPs) should be discontinued when the service user is considered to be no longer infectious.

GPP9.2 The following factors may inform assessment of service user infectivity:

- **infectious agent characteristics including the likelihood of prolonged carriage and/or recurrence**
- **time since specific sign(s) and symptom(s) onset or resolution**

- **time since known exposure**
- **clinical test results**
- **evidence of effective treatment**
- **immune status and/or age of infected person**

GPP9.3 When deciding when to discontinue TBPs, the vulnerability of service users in the vicinity should be considered.

GPP9.4 The need for continued application of TBPs should be reassessed regularly.