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Essential principles of Acute Respiratory Infection (ARI) transmission and infectiousness

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1.1 Background

This document provides current recommendations for infection prevention and control (IPAC) measures for acute respiratory infection (ARI) across both acute and non-acute healthcare settings. The guidance is aligned with the Infection Prevention and Control Policy Directive (PD2023_025) and reflects the practices outlined in the Infection Prevention and Control Practice Handbook.

It draws on best practice IPAC strategies informed by known transmission characteristics of respiratory pathogens and remains adaptable to changes in epidemiology and disease burden within the NSW health system.

A risk based approach underpins all recommendations. Precaution levels are determined through structured assessments, supported by the NSW IPAC Response and Escalation Framework. This framework provides a comprehensive matrix to guide the escalation or de-escalation of IPAC measures based on local transmission risk and any system wide alerts.

Health workers are encouraged to stay up to date by regularly consulting the following resources:

- Coronavirus (COVID-19) - CDNA National Guidelines for Public Health Units
- National updates – Department of Health
- Triggers for Escalation Following Detection of Infection Outbreaks or Clusters (GL2024_013)
- NSW Health COVID-19 and ARI Clinical Guidance
- Cleaning of the Healthcare Environment (PD2023_018)
- CEC Infection Prevention and Control Program
- IPAC guidelines for management and assessment of ARI

These resources offer current information on outbreak management, personal protective equipment (PPE), health worker exposure protocols and setting-specific guidance.

1.2 Scope and purpose

This manual gives evidence-based guidance on infection-prevention measures, PPE use, and precautions to limit the spread of ARI across NSW healthcare settings.

Applicability

The guidance applies to a wide range of healthcare and community care settings, from acute hospitals to aged care, oral health, disability services, community residential homes and mental health services. The intended audience includes NSW health workers and care staff such as:

- Clinicians
- Infection prevention and control professionals
- Managers and administrators
- Allied health and support staff.

Exclusions

This manual does not include detailed guidance on the Respiratory Protection Program. More information and detail about fit testing can be found here. Clinical Excellence Commission, Respiratory Protection Program.

Disclaimer

NSW Health and the Clinical Excellence Commission do not endorse or promote any specific products or equipment mentioned in this document. Recommendations are based on current evidence and are intended to support safe and effective IPAC practices.

1.3 Definitions

The following terms are used frequently in this document in the context of ARI management and prevention.

Term	Definition
Acute respiratory infection (ARI) (Adults)	New onset of at least **one** of the following: • Cough • Sore throat or runny nose • Shortness of breath or difficulty breathing **AND** At least **one** of the following systemic features: • Fever or feverishness • Lethargy, malaise, confusion or decreased appetite • Headache • Myalgia.
Acute respiratory infection (ARI) (Paediatric and/or those who cannot mount an adequate immune response. For example, oncology, elderly, pregnant or immunosuppressed patients)	New onset of at least **one** of the following: • Cough • Sore throat or runny nose • Shortness of breath or difficulty breathing **AND** May or may not include any of the following systemic features: • Fever or feverishness • Lethargy, malaise, confusion or decreased appetite • Headache • Myalgia.
Asymptomatic	The absence of acute respiratory infection symptoms.
Health care associated with acute respiratory infection (HAI ARI)	Suggested definitions: • HAI Influenza: A positive influenza RT-PCR and symptom onset > 72 hours after admission

	• HAI RSV: A positive RSV PCR and symptom onset > 96 hours after admission.
Healthcare associated infection (HAI) COVID-19	**Definite HAI COVID-19** Symptom onset on day >14 after admission **Probable HAI COVID-19** Symptom onset on day 8-14 after admission OR symptom onset on day 3-7 after admission, if epidemiologically linked to a hospital exposure **Community-associated COVID-19** Symptoms present on admission or with onset on day 1 or 2 after admission (unless epidemiologically linked to a hospital exposure during the last 14 days) OR Symptom onset on days 3-7 and a strong suspicion of community transmission Note: If onset of clinical features cannot be defined, a case-by-case assessment is required taking account of the date of sampling relative to the date of admission and epidemiological evidence of a link to hospital exposure.
High risk exposure	For COVID-19 this includes household or household like contact.
High risk settings	All healthcare facilities including aged or disability care facilities.
Hospital onset	Symptoms develop and/or the condition is identified more than 48 hours after the patient has been admitted to hospital. This classification refers solely to the timing of symptom onset or diagnosis and should not be taken as evidence that the condition was acquired in the healthcare setting. Determination of the likely source of acquisition requires further epidemiological investigation.
Outbreak	An outbreak is a state characterised by an incidence of an infection greater than what is typically expected in a particular healthcare setting. Typically, in healthcare this has been defined as two or more cases, which should trigger an outbreak management process. For ARI, two or more cases should trigger a management plan and may be considered an outbreak depending on surrounding circumstances and transmission pathways. For more information on outbreak management refer to CEC Infection Prevention and Control Practice Handbook and for specific guidance on residential aged care and residential homes refer to Managing infectious respiratory diseases in aged care.
Resolution of symptoms	Resolution of fever and significant improvement of ARI symptoms for at least the preceding 24 hours. Symptoms such as headache, fatigue, anosmia, ageusia or a mild persistent cough may continue for some weeks and for health workers will not usually affect time to return to work.
Risk mitigation	In this context a combination of actions including source control (mask wearing, surgical or P2/N95), and in some cases testing

	even when there are very mild symptoms to reduce the risk of onward transmission of ARI pathogens.
Surveillance /screening test	Testing of asymptomatic staff in the context of widespread community transmission of a novel virus (for example, in the early part of the COVID-19 pandemic), where staff in some high-risk units may undergo regular surveillance testing. This is to be distinguished from symptomatic testing.
Zone	A zone is a clearly defined physical or functional area within a healthcare setting that is designated based on infection risk, patient status, or required IPC measures for ARIs. Zones are used to separate and manage risk of ARI transmission. They may be defined by: • Clinical function (for example, patient care vs non-clinical areas) • Infection risk level (for example, red, amber, green zones) • PPE requirements (areas requiring specific protective equipment)

1.4 How ARIs spread

Acute respiratory infections (ARIs) are transmitted when viruses are expelled from the respiratory tract of an infected individual and enter the environment, where they can infect the respiratory tract of a susceptible person. Transmission risk is influenced by viral characteristics, host factors and environmental conditions.

Updated terminology from leading health agencies

The World Health Organization (WHO), in collaboration with major public health agencies, introduced updated terminology to improve clarity and consistency in describing airborne transmission of respiratory pathogens.

The term 'infectious respiratory particles (IRPs)' is now recommended to describe particles expelled from the mouth or nose during breathing, talking, coughing, sneezing, singing or other expiratory activities (WHO).

Modes of transmission

Respiratory pathogens can spread through four primary modes:

1. Respiratory particles:
    - Large droplets – typically fall to the ground within 1–2 metres.
    - Fine aerosols – can remain suspended in the air and travel longer distances, especially in poorly ventilated spaces.
2. Direct contact – physical contact with an infected person.
3. Indirect contact (fomites) – touching contaminated surfaces or objects.
4. Airborne transmission – under specific conditions, smaller particles can remain airborne and lead to infection.

For more information refer to the *Infection prevention and control practice handbook, Chapter 2 - Figure 4 Features of infectious respiratory particles and descriptors for modes of transmission*.

SARS-CoV-2 (COVID-19)

SARS-CoV-2 exhibits specific transmission characteristics that influence spread in communities and healthcare settings:

- primary transmission route is via IRPs.
- the virus replicates in the respiratory tract, with peak viral load occurring just before symptom onset and during the first 5 days of illness.
- transmission can occur from asymptomatic or pre-symptomatic individuals, contributing to widespread community spread.

Influenza and Respiratory syncytial virus (RSV)

Influenza and RSV are common respiratory pathogens with distinct transmission characteristics that influence their spread in healthcare and community settings:

- they primarily spread via large respiratory droplets, especially during coughing or sneezing.
- both are more transmissible when symptoms are present
- fomite transmission is also possible, particularly in shared environments.

Key transmission factors

Most ARI transmission occurs through close contact, especially:

- among household members, who are at the highest risk due to prolonged exposure.
- during activities that generate respiratory particles, such as talking, coughing, sneezing, singing or shouting.

Respiratory particles cause infection when they are inhaled into the lungs and/or deposited on mucous membranes (for example, inside the nose, mouth or eyes).

Airborne transmission conditions

While close contact is the dominant mode of transmission, infectious respiratory particles exist across a spectrum of sizes, including larger droplets and smaller aerosols. Transmission commonly occurs at close range through exposure to larger respiratory droplets generated during breathing, talking, coughing, or sneezing. Airborne transmission via smaller particles may occur under specific circumstances, including:

- enclosed or poorly ventilated spaces, where particles accumulate.
- expiratory exertion (for example, singing, shouting, exercising)
- aerosol-generating procedures (AGPs) such as positive pressure mask ventilation, tracheal intubation and extubation which increase particle concentration.
- inadequate ventilation or air handling, allowing infectious particles to remain suspended in the air.

1.5 Incubation, infectious period and deisolation

The incubation period refers to the time between exposure to a virus and the onset of symptoms. The infectious period is the timeframe during which an infected individual can transmit the virus to others. For more information refer to *Table 1 ARI Incubation, infectious period and deisolation.*

Table 1 ARI - Incubation and infectious period

Pathogen	Incubation period	Infectious period
SARS-CoV-2	From 2-4 days Incubation period has changed with variant evolution and is currently shorter than the first variants.	From 1-3 days prior to symptoms and then for at least 5 days after symptoms start. The infectious period may be extended if there are ongoing symptoms.
Influenza	From 1-3 days	From the day before onset of symptoms for up to 7 days. The use of effective antivirals reduces the infectious period to about 3 days.
RSV	From 4-6 days Immunocompromised and neonates may shed RSV for 4 weeks or longer	From onset of symptoms for 5-8 days

Table 2 Deisolation guidance

Setting/decision point	COVID-19	Influenza	RSV	All ARIs (immunocompromised*)
Note: Deisolation requires a combination of the below. The resolution of acute respiratory symptoms for at least 24 hours from symptom onset and in some cases retesting for all ARI pathogens.				
Return to ward/ out of isolation (incl. RACF)	Five days since symptom onset (or positive test if asymptomatic) AND COVID-19 RAT is negative OR Seven days since symptom onset with no testing. During isolation, case can cohort with COVID-19 cases.	If treated with antivirals: Three days after effective antiviral treatment OR If not treated with antivirals: Five days since symptom onset. No testing required. Can cohort with influenza cases.	Adults: May be released from isolation once asymptomatic for >24 hours. Children: Must be asymptomatic and reviewed by a medical team prior to de-isolation. No testing required. Can cohort with other RSV cases.	Immunocompromised patients may shed infectious virus for many weeks after initial infection and deisolation needs individual assessment. Even if asymptomatic, patients should remain in isolation for at least 7 days after the onset of symptoms.
Discharge to community	Isolate at home until day 5 AND resolution of acute symptoms for at least 24 hours. Avoid high risk settings until day 7.			Isolate at home until ≥day 7 AND ≥24 hours symptom resolution. Avoid high risk settings until ≥day 14.
Outpatient appointment after discharge	Notify clinic of recent diagnosis. Wear mask if symptomatic.			Notify clinic of recent diagnosis. Clinic may request testing and/or mask wearing.

*A number of conditions may cause or be associated with significant immunocompromise and this is associated with prolonged viral shedding in many patients after an ARI. Some of the more common conditions are (noting this list is not exhaustive):

- solid organ transplant on immune suppressive therapy
- haematopoietic stem cell transplant in the past 2 years

- immune suppressive therapy for graft versus host disease
- an active haematological malignancy
- human immunodeficiency virus infection with CD4 T-lymphocyte count below 200 cells/per mm3 (age adjusted for children)
- renal dialysis (but additional risk assessment recommended)
- other conditions specifically noted by the treating medical practitioner.

For other viral causes of ARI (for example, rhino virus, human metapneumovirus, corona viruses) the same principles apply. Isolate patients when symptomatic and deisolate once acute symptoms have resolved for at least 24 hours.