Interior Health
INFECTION PREVENTION & CONTROL

A ***PRINTED*** copy of this resource may not be the most recent version.

Airborne Precautions in Operating Rooms – Best Practice Recommendations

Key Messages for Patients on Airborne Precautions

- Proceed if surgery is deemed urgent/emergent. If possible, delay elective procedures. See Section 4.
- Ensure all health care providers are notified of the patient's diagnosis and need for Additional Precautions. Place an Additional Precautions sign on the OR door. See Section 6.
- OR airflow remains positive pressure, with air discharged outside. See Section 3.
- The patient wears a medical mask during transport. OR personnel wear a fit-tested N95 respirator. Don and doff PPE in designated areas in the corridors. See Section 5.1.
- Intubate the patient in the room where the procedure will occur. See Section 5.2.
- Extubate and recover the patient in the room where the procedure occurred. See Sections 6 and 7.
- Keep the door closed and allow air clearance time before the room is cleaned, unless EVS staff wear a fit-tested N95 respirator. See Section 7.

Application

Interior Health employees, members of the medical and midwifery staff, students, volunteers and other persons acting on behalf of Interior Health (including contracted service providers as necessary).

1. General Principles

1.1 Routine Practices are a standard of care used for all patients to reduce the risk of infection.

1.2 Additional Precautions are the use of extra measures for contact with a patient known or suspected to be infected or colonized with certain microorganisms and based on the potential for transmission of the microorganism. Routine practices continue when Additional Precautions are in use.

1.3 Airborne Precautions are used for communicable disease pathogens transmitted through the air over extended time and distance by small particles and aerosols containing droplet nuclei (including but not limited to pulmonary tuberculosis or measles).

- Some infections, e.g., disseminated shingles/primary varicella need a combination of additional precautions as the causative organism can be transmitted by more than one route.
- OR and perioperative staff must have a current annual N95 fit test and know their immune status for vaccine preventable airborne communicable diseases, e.g., measles, varicella.

1.4 Airborne communicable diseases currently include, but are not limited to:

1.4.1 Tuberculosis (TB)

- Potential for transmission is more likely with respiratory disease:
  - Pulmonary.
  - Laryngeal.
  - Miliary.
- Airborne precautions are also required for extra-pulmonary TB if the procedure could aerosolize drainage.

1.4.2 Rubeola (measles, red measles)

- Includes exposed and susceptible individuals who are in the incubation period of the disease.

1.4.3 Varicella-zoster virus

- Primary varicella (chickenpox) - includes exposed and susceptible individuals who are in the incubation period of the disease.
- Disseminated shingles.
- Localized shingles in an immunocompromised patient.

1.4.4 Less common diseases

- Smallpox.

1.4.5 Patients with viral respiratory illness (e.g. COVID-19, influenza, parainfluenza, RSV and other viral pathogens) who require aerosol-generating medical procedures (AGMP) including intubation/extubation require Airborne Precautions. Refer to PICNet for further information.

1.5 If surgery is required for a patient with a suspected or confirmed airborne communicable disease:

- Refer to the IPAC Acute Care Resource Manual – Diseases and Conditions Table.
- Consult IPAC and Medical Microbiologist on call.
- For TB cases consult IPAC, Medical Microbiologist or TB Services physician.

2. Clearance Time [also referred to as "settle time"]

2.1 Facilities Maintenance must determine air change rates for each OR. Refer to Table 1.

2.2 After a patient on Airborne Precautions has been transferred to the patient care unit, ensure adequate **air clearance/settle time** of at least 99% of airborne particles before the next patient enters the OR. Health care providers may enter the OR prior to the completion of the clearance/settle time if a fit-tested N95 respirator or equivalent is worn. Refer to Table 1.

Table 1: Clearance/settle times based on the air change rates provided by Facilities Maintenance

The Canadian Tuberculosis Standards - 8th Edition (Chapter 14., 3.1.5)	
OR air changes per hour	Minutes required for 99% air clearance
6	46
12	23
15	18
20	14
unknown	120

Note: *99% air clearance is sufficient to allow room entry, rather than waiting for 21 minutes to allow 99.9% air clearance.*

3. OR Airflow Requirements

3.1 Positive Pressure

3.1.1 It is against CSA standards for any healthcare room to be capable of BOTH positive and negative pressure settings. Rooms may be positive pressure and neutral or may be negative pressure and neutral. It is possible to create a negative airflow, however that is at the risk of disrupting air pressure differentials in other areas.

3.1.2 ORs are set to positive pressure airflow to minimize the risk of surgical site infection (SSI). The sterile core is the most positive, then ORs. The racetrack is positive in relationship to surrounding areas, but not to the sterile core or ORs.

3.1.3 Use of ORs with negative airflow capability with a minimum of 15 air changes per hour minimizes the risk of exposures and transmission due to a suspected/confirmed airborne infection. However, switching to negative airflow increases the SSI risk. Note: there is a single OR in Interior Health at KGH which has negative pressure capability (OR12, IHSC).

3.2 Ventilation measures are in place in Interior Health P3 facilities (KGH, PRH, RIH, VJH) to remove contaminated air, which include:

3.2.1 Laminar flow diffusers over the patient;

3.2.2 Air changes (minimum of 20 hour);

3.2.3 Mixing of outdoor and recirculated air; and high-efficiency particulate air (HEPA) filtration.

3.3 Monitoring of pressure differential, alarms, and testing

3.3.1 Facilities Maintenance must confirm that OR air is discharged outside, not into the corridor.

3.3.2 Facilities Maintenance monitors pressure differential either manually or electronically through the building maintenance system or on local pressure readouts within ORs.

3.3.3 Facilities Maintenance sets up differential pressure measurement and air change per hour calculation as part of their annual preventative maintenance program.

3.3.4 Preventative maintenance on ORs not capable of negative pressure is done on an annual basis and documented by service providers.

3.3.5 Facilities Maintenance documents and keeps records of test results.

3.4 Refer to Canadian Standards Association (CSA) Z317.2:24. Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in healthcare facilities for further details.

4. Decision Process

4.1 Determine whether the surgery is urgently required in consultation with the surgeon, anesthesiologist and OR manager/designate. Consult with IPAC, Medical Microbiologist on Call and/or Communicable Disease Unit as needed. Considerations may include:

a) Patient case specifics e.g., clinical presentation, exposure risk factors, type of surgery required, etc.
b) Is patient considered to be communicable?
c) Can surgery be performed safely at another acute care site?
d) Is patient stable enough for transfer?

4.2 What are current site's capabilities/infrastructure? Consult with Facilities Maintenance as required.

4.3 If possible, delay elective surgical procedures until Airborne Precautions are discontinued, e.g., an airborne infection has been ruled out or until the patient is no longer infectious.

4.4 For urgent/emergent surgical procedures, determine if surgery can be performed on-site or if patient transfer is required.

4.5 Sites performing surgery:

- An appropriate OR is available as per unit/department process.
- All health care providers assigned to the case, including the anesthesia team, are notified of the suspected or confirmed diagnosis.
- Scheduling is an operational decision.
  - Consider scheduling as last case of the day.
  - Ensure adequate clearance/settle times regardless of when case scheduled, see Section 2, Table 1.

5. Pre-operative Management

5.1 Patient Transport

5.1.1 PPE

- The patient must wear a medical mask during transport. Consider alternate strategies for neonates, infants, toddlers who cannot tolerate a mask, e.g., cuddle position facing towards care provider.
- Health care providers accompanying patient must wear a fit-tested N95 respirator during transport.

5.1.2 Sites should have a clearly documented process for patient transport.

- Use pre-determined transport routes to minimize exposure for healthcare providers, other patients and visitors.
- A team member or Protective Services member clears the path from the patient care unit to the OR.

5.1.3 Avoid performing aerosol-generating medical procedures (AGMP) enroute.

5.1.4 Transport the patient directly into the OR and bypass the holding area.

5.2 Intubation

5.2.1 The anesthesia machine requires two disposable hydrophobic HEPA filters (inlet and outlet) that provides filtration at ≥ 99.97% at ≥ 0.3 microns.

5.2.2 The anesthesiologist intubates the patient (may use a video laryngoscope) and places a bacterial/viral heat and/or moisture exchange (HME) filter between the endotracheal tube and the Y-piece, e.g., inspiratory limb.

5.2.3 Use a disposable anesthesia circuit.

5.2.4 If a disposable circuit is not available, change the entire circuit after the surgery is complete and reprocess according to the manufacturer's instructions.

5.2.5 Limit health care providers present to those essential to perform intubation, if possible, e.g., anesthesiologist and assistant.

6. Peri-operative Management

6.1 Post an Airborne Precautions sign on every door into the OR.

6.2 All OR personnel follow Airborne Precautions and must wear fit-tested N95 respirators.

6.3 Strictly control traffic into and out of the OR to ensure adequate air changes are maintained.

- Doors to the OR are kept closed except when moving patients and supplies in or out.
- Carefully plan equipment and supply needs to minimize traffic and air flow disruptions.

7. Post-operative Management

7.1 The patient will be extubated and recovered either in the OR or in the Post Anesthetic Recovery unit (PAR) provided an airborne isolation room is available.

7.2 Personnel not required for extubation, or post-operative recovery should leave the OR before extubation and should not re-enter until after air settle/clearance times are completed.

7.2.1 Health care providers must wear a fit-tested N95 if entering the room before settle/clearance time is complete.

7.3 Extubation in the OR preferred.

- As with intubation, minimal personnel should remain in the OR.
- Extubate directly to face mask.
- A simple oxygen mask can be placed over or under the procedure/surgical mask or if using a nasal cannula, place it under procedure/surgical mask.
  - Procedure mask, e.g., with ear loops, preferred for patient.
  - If using surgical mask (with ties), tie mask securely to ensure good fit, e.g., no gaps.
- Remove oxygen as soon as patient condition deems it is safe to do so, and place medical mask on patient.

7.4 After the patient leaves the OR

- Keep the OR door closed to allow airborne particles to clear/settle.
- Follow air clearance/settle times outlined in Section 2, Table 1.
- All health care providers entering room before air clearance/settle time is completed must wear a fit-tested N95 respirator.
- Do not remove the Airborne Precautions sign until after cleaning done.
- If not the last case of the day; complete air clearance/settle time before the next patient enters the OR.

7.5 Clean room according to usual OR Cleaning processes.

7.6 Send re-usable medical devices to the Medical Device Reprocessing Department as per usual process.

7.7 Use routine practices when handling laundry, garbage and biomedical waste.

Definitions

Term	Definition
Aerosol-generating medical procedures (AGMP)	Medical procedures that can generate aerosols (solid or liquid particles ranging in size from 10 µm–100 µm suspended in the air) because of artificial manipulation of a person's airway.
Airborne exposure.	May occur if small particles, i.e., aerosols containing droplet nuclei with viable microorganisms are generated, propelled over short or long distances and inhaled.
Airborne isolation room	A room that is designed to maintain negative pressurization relative to adjacent areas; and is constructed and well-ventilated to limit the spread of microorganisms from an infected occupant to the surrounding areas of the health care facility.
Air exchange	The ratio of the airflow in volume units per hour to the volume of the space under consideration in identical volume units, usually expressed in air changes per hour (ACH).
Air settle/clearance time	The time needed (in minutes), based on the number of air changes per hour to reduce airborne contaminants in the room by 99% or 99.9%.
Anteroom	A small room or space at the entrance to an airborne isolation room that is separated by doors from both the outside and the main space in the airborne isolation room; allows for storage and removal of PPE and provides an airlock between adjacent space and patient.
Bacterial/viral filter	A filter that provides filtration at > 99 % at 0.3 microns. Use of the filter in the inspiratory limb between the endotracheal tube and ventilator circuit of the breathing circuit protects the patient from the anesthesia machine, and a filter in the expiratory limb protects the anesthesia machine from the patient.
Fit-tested	The use of a qualitative or quantitative method to evaluate the fit of a specific make, model and size of respirator on an individual.
High-efficiency particulate air (HEPA) filtration	Achieved using a high-efficiency particulate air filter to remove ≥99.97% of particles 0.3 µm in size. The filter can be either portable or stationary.
Negative pressure	Special ventilation to create inward directional airflow to the room, relative to the adjacent area. Negative pressure keeps air from flowing out of the room and into adjacent rooms or areas.
N95 respirator	A disposable particulate respirator that is ≥95% efficient at removing 0.3 µm particles (the most penetrating particle size) and is not resistant to oil.
Operating Room (OR)	A restricted room within a surgical suite designated and equipped for the purposes for performing a surgical operation.
Pressure differential	A measurable difference in air pressure that creates a directional airflow between adjacent compartmentalized spaces. (Refer to Appendix B) Positive and negative pressures refer to a pressure differential between two adjacent air spaces. Air flows away from areas or rooms with positive pressure (pressurized), while air flows into areas with negative pressure (depressurized).

References

1. Canadian Standards Association. 2019. CSA Z317.2-19 Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities.
2. Canadian Tuberculosis Standards – 8th Edition (Chapter 14) Canadian Journal of Respiratory, Critical Care, and Sleep Medicine, Volume 6, Issue sup1 (2022).

Effective Date	August 22, 2025		
Last Reviewed			
Partners Reviewed	Surgical Services, P3 Operations		
Approved By	IPAC		
Owner	Infection Prevention and Control		
Revision History	Date	Section	Revision
	Sept. 3, 2025	1.4, Table 1, 4.1	Add AGMP, add viral respiratory pathogens, clarify decision considerations