Guidance Document for COVID-19

Thunder Bay Regional Health Sciences Centre

Title: Aerosol Generating Medical Procedures	**Version #:** 2
Pre-Approved for IMT: Operations **Approved:** Incident Manager **Signature:**	**Approval Date:** April 27, 2021
This document is intended to provide guidance to staff/professional staff during COVID-19	

1. PURPOSE

To prevent transmission of infection associated with aerosols produced by aerosol generating medical procedures (AGMPs).

GUIDELINES (e.g. background, definitions, procedure, etc.)

POLICY STATEMENT

Medical procedures that generate aerosols or droplet nuclei in high concentration present a risk for opportunistic airborne transmission of pathogens not otherwise not spread by the airborne route (e.g., SARS, COVID-19, influenza) and increase the risk for transmission of organisms known to spread by the airborne route (e.g., TB). Healthcare workers follow the measures outlined in this policy to prevent transmission of infection associated with aerosols in relation to AGMPs.

SCOPE

This policy applies to any healthcare worker who performs or assists with an AGMP and any healthcare worker who enters a room or bed space during an AGMP or prior to when the appropriate air clearance time has elapsed since an AGMP was performed.

DEFINITIONS

Aerosol generating medical procedure (AGMP): Any procedure carried out on a patient that can induce the production of aerosols of various sizes, including droplet nuclei. Table 1 lists procedures currently deemed by the Hospital as AGMPs. Table 2 lists procedures deemed by the Hospital not to be an AGMP. A procedure performed with a new device or equipment purchased which has the potential to generate patient-derived aerosols, is deemed as an AGMP in accordance with the manufacturer's guidance.

Table 1: Current List of Procedures that are AGMPs
•Intubation, extubation and related procedures (e.g. manual ventilation and open suctioning)
•Manual ventilation
•Tracheotomy or tracheostomy procedures (insertion or removal)
•Bronchoscopy
•Dental procedures (using high speed devices such as ultrasonic scalers and high speed drills)
•Non-invasive ventilation (NIV); Bi-level Positive Airway Pressure Ventilation (BiPAP) and Continuous Positive Airway Pressure Ventilation (CPAP)

Table 1 (cont'd): Current List of Procedures that are AGMPs
•Respiratory tract suctioning
•Upper ENT airway procedures that involve suctioning
•All upper gastro-intestinal endoscopy
•Surgery and post mortem procedures involving high speed devices*
•High flow nasal oxygen or cannula (HFNO or HFNC) (e.g., Airvo and Optiflow)
•Oxygen delivered at greater than 6 liters per minute by nasal prongs or greater than 15 liters per minute by non-rebreather masks or filtered non-rebreather masks (e.g. Tavish mask).
•Transesophageal echocardiogram
•Pulmonary function testing (nebulized Methycholine)
•Chest tube removal or insertion in setting of emergent insertion for ruptured lung/pneumothorax
•Sputum production and cough generating procedures
•Nebulized therapy
*For COVID-19, the use of high speed devices in surgery/post-mortem procedures is considered an AGMP only if it involves the respiratory tract or paranasal sinuses.

Table 2: Current List of Procedures that are not AGMPs
• Collection of nasopharyngeal or throat swab
• Ventilator circuit disconnect
• Chest compressions
• Chest tube removal or insertion (unless in setting of emergent insertion for ruptured lung/pneumothorax)
• Coughing, expectorated sputum
• Oral suctioning
• Oral hygiene
• Colonoscopy
• Laparoscopy (gastrointestinal/pelvic)
• Cardiac stress tests
• Caesarian section or vaginal delivery of baby done with regional anaesthesia
• Any procedure done with regional anaesthesia
• Electroconvulsive therapy
• Nasogastric/nasojejunal tube/gastrostomy/gastrojejunostomy/jejunostomy tube insertion
• Bronchial artery embolization
• Chest physiotherapy (outside of breath stacking)
• Oxygen delivered at less than or equal to 6 liters per minute by nasal prongs, or less than or equal to 15 liters per minute by non-rebreather masks
• Intranasal medication administration such as naloxone

Airborne Infection Isolation Room (AIIR): A room that is designed, constructed and ventilated to limit the spread of airborne microorganisms from an infected occupant to the surrounding areas of the

health care setting. As per section 6.10.4.2.3 of CSA Z317.2:19, it is equipped with an anteroom with a closeable door.

Healthcare Worker: Any member of the staff, professional staff, researcher, learner, volunteer or contractor at the Thunder Bay Regional Health Sciences Centre.

Patient Environment: The immediate space around a patient that may be touched by the patient and may also be touched by the health care provider when providing care. In a single room, the patient environment is the room. In a multibed room, the patient environment is the area inside the individual's curtain. In an ambulatory setting, the patient environment is the area that may come into contact with the patient within their cubicle. In a nursery/neonatal setting, the patient environment includes the inside of the bassinette or incubator, as well as the equipment outside the bassinette or incubator used for that infant (e.g., ventilator, monitor).

PROCEDURE

1.1. Carefully assess the patient who requires an AGMP for signs and symptoms of airborne infection and acute respiratory infection prior to performing an AGMP.

1.2. Perform only essential AGMPs for the following infection cases:

- Patients with known or suspected infection transmitted by the airborne route (e.g., tuberculosis, varicella zoster virus, measles).
- Patients with known or suspected viral hemorrhagic fever (e.g., Ebola)
- Patients with known or suspected influenza-like illness, novel respiratory pathogen, or for whom status of respiratory infection is unknown (including: novel/pandemic influenza, seasonal influenza, COVID-19, MERS and SARS coronavirus).

1.3. Whenever possible, plan to perform all AGMPs in an AIIR, or in a private or procedure room with the door closed.

1.4. Consider infection status, risk and frequency of AGMP indicated, and patient immune status when assessing environmental control requirements (i.e., private room priority).

- Accommodate any patient who is known or suspected to be infected with an agent spread via the airborne route to an Airborne Infection Isolation Room (AIIR) prior to undergoing an AGMP
- Refer to Table 3 to identify what environmental controls are required (e.g., airborne infection isolation room, private room, etc.) when performing non-emergent AGMPs.

Table 3: IPAC Considerations for AGMP	
Known or Suspected Infection	**Environmental Controls for AGMP**
Tuberculosis, Measles, Varicella zoster virus	• Airborne Infection Isolation Room (AIIR) required
VHF (e.g., Ebola), SARS, MERS COVID-19, Novel or Pandemic Influenza	• AIIR preferred (negative pressure) • If AIIR unavailable, private or procedure room with door closed required
Seasonal Influenza	• Private or procedure room with door closed preferred • If private room unavailable, perform AGMP in patient's care space with privacy curtains drawn
Non-Influenza Respiratory Viruses	• Private or procedure room with door closed preferred • 2 meter separation from other patients during AGMP, if not available, draw privacy curtain
Patient requires droplet precautions for any other reason than those listed above.	
Patient requires only contact precautions	
Patient only requires routine practices	

- If a private or procedure room is not available and the priority placement assessment has determined the AGMP will occur in place, draw the privacy curtains and remove any shared equipment, supplies or linens from the immediate vicinity prior to performing the AGMP.

1.5. Prior to the AGMP being performed, limit the number of healthcare workers in the room/ bed space to only those necessary for the procedure, close the door to the room or draw the privacy curtain and post an AGMP in progress sign on the door / curtain:
  - If anywhere in the hospital other than in the operating room (O.R.), post the 'AGMP in progress – Airborne/ Droplet/Contact precautions required' sign (FCS-453).
  - In the O.R., use the 'AGMP in progress- A minimum of Airborne/Droplet precautions required' sign (FCS-451).

1.6. Perform a point-of-care risk assessment (PCRA) to select the appropriate personal protective equipment (PPE) before entering the room/ bed space while an AGMP is in progress, performing or assisting with an AGMP, or entering a room/bed space where an AGMP was performed prior to when the appropriate air clearance time has elapsed:

- At minimum, don eye protection and a N95 respirator for any AGMP
  - The Hospital requires that a N95 respirator be used in relation to all AGMPs in order to prevent the spread of respiratory pathogens (e.g., COVID-19) by asymptomatic carriers.
  - In the O.R., health care workers have the option of using a Versoflow Powered Air Purifying Respirator (PAPR) hood with surgical mask (hygienic purposes) in lieu of a N95 respirator and eye protection.
- If in the O.R. and coming within 2 meters of the patient / patient environment while the AGMP is in progress or if the AGMP has occurred and the appropriate air clearance time has

not yet elapsed, also don a gown, gloves, a bouffant cap and boot covers if indicated by the PCRA. The PCRA must consider any required additional precautions.

- If anywhere outside the O.R., also don a gown and gloves if coming within 2 meters of the patient / patient environment while the AGMP is in progress or if the AGMP has occurred and the appropriate air clearance time has not yet elapsed.
- Regardless of location, if the patient is known or suspected be infected with COVID-19 and has not yet been cleared by IPAC / Public Health, or has had a high risk exposure to COVID-19 in the past 14 days (even if they have recently tested negative for COVID-19), or is symptomatic for COVID-19 and COVID-19 has not been ruled out, don at minimum the following:
    - gloves,
    - gown,
    - eye protection, and
    - N95 respirator or PAPR.

1.7. Prior to leaving the patient's room/bed space, if gloves and gown were required, remove gloves and gown disposing into either a hands-free waste receptacle (if disposable) or in a separate receptacle to go for reprocessing (if reusable). Perform hand hygiene.

- If leaving or entering an inpatient or operating room that is equipped with an anteroom while an AGMP is in progress or prior to the air clearance time elapsing, minimize the disruption of the pressure gradient and room air flow by:
    - Limiting in/out traffic to minimize airborne contamination of the adjacent spaces.
    - If entering or exiting the patient room is required:
        - ✓ Only use the door between the patient room and the anteroom when entering or exiting the patient room. All other doors must remain shut.
        - ✓ Only open the door between the hallway and the anteroom if the door between the anteroom and the patient room is closed.
        - ✓ Only open the door to the ante room if the door between the anteroom and the hallway is closed.
        - ✓ Minimize the time a door is kept open (e.g., never prop any door open)

- If leaving or entering an inpatient or operating room that is not equipped with an anteroom while an AGMP is in progress, minimize the disruption of the room air flow by:
    - Limiting in/out traffic through the door/curtain to minimize airborne contamination of the adjacent spaces
    - If entering or exiting the patient room/area is required, minimize the time a door / curtain is kept open (e.g., never prop the door open, immediately close the curtains once you have exited or entered the space)

1.8. Once outside the patient's room/bed space or inside the anteroom with the door closed, remove eye protection and N95 respirator, and dispose of it in either a hands-free waste

receptacle (if disposable) or in a separate receptacle to go for reprocessing (if reusable). Perform hand hygiene.

1.9. Once the AGMP is complete, keep the door to the patient room closed to allow for an appropriate number of air exchanges to elapse following the end of the procedure, or, if a patient is known or suspected to be infected with an agent that is spread by the airborne route, following the time the patient was removed from the room.

- Determine the length of time required to achieve appropriate air clearance for the room type by referring to Table 4 and calculate the date and time when the appropriate air clearance will be achieved. If the duration of time is not listed for the room type, calculate using a value of 60 minutes.
- See Section 1.7 regarding in/out traffic during the clearance time

Table 4: Duration of time to achieve appropriate air clearance by room type

Room Type	*Minutes required for appropriate air clearance (i.e., removal efficiencies of 99% of Airborne Contaminants)	
Inpatient area		
AIIR	35 minutes	
Treatment Room (positive pressure)	52 minutes	
Private (positive pressure)	75 minutes	
Ward (positive pressure)		
Semi (positive pressure)	69 minutes	
Intensive Care Unit		
ICU 1, 2, 21 and 22 (AIIR)	35 minutes	
ICU 4,5, 6, 7, 8 and 10 (negative pressure)	14 minutes	
Standard room (positive pressure)	38 minutes	
Emergency Department	**Patient requiring enhanced air clearance protocol****	**Any other patient**
Trauma 1 and 2 (AIIR)	14 minutes	At most responsible physician's (MRP's) clinical discretion
C15 and C16 (AIIR)	31 minutes	
C10, C11, C12 (negative pressure)	26 minutes	
Operating Room		
OR 9 (negative pressure)	21 minutes	At surgeon's clinical discretion
OR 8 (negative or positive pressure convertible)	21 minutes	
OR 3 - 7 and 10 - 15 (positive pressure)	21 minutes	
OR 1 and 2 (positive pressure)	28 minutes	
Other Rooms		
Rm 3606 - Bronchoscopy suite (negative pressure)	21 minutes	At MRP's clinical discretion

Table 4 (cont'd): Duration of time to achieve appropriate air clearance by room type
*For patient known or suspected to be infected with an agent spread by the airborne route (e.g. TB), clearance time is calculated from the time the patient has left the room. For all other patients, clearance time is calculated form the time the AGMP was completed. **Includes any patient known or suspected to be infected with a respiratory agent that is spread by the airborne or droplet route. In addition to cases of TB, this also includes, but is not limited to, any patient who has previously tested positive for COVID-19 and has not yet been cleared by IPAC / Public Health, any patient who has had a high risk exposure to COVID-19 in the past 14 days (even if they have recently tested negative for COVID-19), Any patient who is symptomatic for COVID-19 who did not have a high risk exposure to COVID-19 in the past 14 days who has not been tested for COVID-19 within 24 hours- 7 days (7 days if self-isolating post COVID-19 test).

1.10. If working anywhere in the hospital other than in the OR, record the calculated date and time on the 'Air clearance in progress- Airborne/Droplet/Contact precautions required' sign (FCS-454) and post it on the closed door of the room or on the curtain. In the OR use the 'Air clearance in progress- A minimum of Airborne/Droplet precautions required' sign (FCS-452).

1.11. Once an AGMP is no longer in progress, staff wear an N95 respirator/PAPR when in the room/bed space, keep the door/ curtain closed and minimize in/out traffic for no less than the air clearance time specified in Table 4.

- When movement in/out of the room is required prior to the clearance time elapsing, follow the measures specified in 1.7 to minimize airborne contamination of the adjacent spaces.

1.12. Once the amount of time required to achieve appropriate air clearance for the room type has elapsed remove the sign.

1.13. Air clearance times for rooms are identified by Maintenance and calculated using air changes per hour (ACH) and time (T) in minutes required for removal efficiencies of 90%, 99% or 99.9% of Airborne Contaminants as described in Table 5.

Table 5: Air Clearance Times

Air changes per hour	Minutes required for removal efficiency of		
	90%	99%	99.9%
1	138	276	414
2	69	138	207
3	46	92	138
4	35	69	104
5	28	55	83
6	23	46	69
7	20	39	59
8	17	35	52
9	15	31	46

Table 5 (cont'd): Air Clearance Times			
Air changes per hour	Minutes required for removal efficiency of		
	90%	99%	99.9%
10	14	28	41
11	13	25	38
12	12	23	35
13	11	21	32
14	10	20	30
15	9	18	28
16	9	17	26
17	8	16	24
18	8	15	23
19	7	15	22
20	7	14	21

This table is prepared according to the formula T=[In (C2/C1)/(Q/V)]x60, which is an adaptation of the formula for the rate of purging airborne contaminants (100-Mutchler 1973) with

t1=0 and C2/C1=1— (removal efficiency/100), where:
t1 = initial time point
C1 = initial concentration of contaminant
C2 = final concentration of contaminants
Q = air flow rate (cubic feet per hour)
V = room volume (cubic feet)
Q/ V = air changes per hour

2. RELATED POLICIES, PRACTICES AND/OR LEGISLATIONS

TBRHSC Policy, "Management of Novel Respiratory Infections (IPC-2-16)" available on the intranet.

TBRHSC Policy, "Applying Routine Practices and Additional Precautions (IPC-1-18) available on the intranet.

TBRHSC Policy, "Infection Precautions Chart (IPC-2-08)" available on the intranet.
Public Health Ontario. Technical Brief: IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19. July 7, 2020. Available: https://www.publichealthontario.ca/-/media/documents/ncov/updated-ipac-measures-covid-19.pdf?la=en

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3. REFERENCES

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