

Tip sheet: Donning and doffing personal protective equipment (PPE) for aerosol generating medical procedures (AGMPs) during COVID-19¹

Purpose: Healthcare practitioners can reference this document to review best practices for donning and doffing PPE for **aerosol generating procedures (AGMPs)** during COVID-19.






What are AGMPs?^{2,3}

Aerosol-generating medical procedures (AGMPs) include any procedures that produce aerosols (i.e., small droplets of moisture carrying microorganisms) of any size. AGMPs are not commonly conducted in the long-term care setting. Examples of AGMPs include:

- Cardio-pulmonary resuscitation
- Open airway suctioning
- Non-invasive positive pressure ventilation for acute respiratory failure (CPAP, BiPAP)

What are the PPE recommendations for AGMPs?

In addition to routine practices⁴, the current recommendation for invasive, potentially aerosol-generating procedures with probable, suspected or confirmed cases of COVID-19 is droplet and contact procedures and airborne procedures. These precautions include proper use of:

1		N95 mask	2		Eye protection (e.g., face shield or goggles)
3		Isolation gown (e.g., at least level 2 disposable or reusable gown; for some procedures a level 4 gown may be preferred)	4		Pair of gloves
5		If available, airborne infection isolation room (i.e., "negative pressure room")			

This document provides guidance on proper PPE use for AGMPs only. For all procedures, it is recommended that you have a spotter with you to assist you with donning and doffing.

Please note: For every patient and/or patient environment encounter, always apply the Four Moments for Hand Hygiene (i.e., before initial patient/patient environment contact; before aseptic procedure; after body fluid exposure risk; after patient/patient environment contact).

¹This content has been adapted from a live webinar tutorial on protected code blues and managing acutely ill patients with COVID-19 presented by Dr. Natalie Wong and Dr. Alberto Goffi. This webinar can be found here: <https://vimeo.com/408056371>

²Ontario Agency for Health Protection and Promotion, Provincial Infectious Diseases Advisory Committee. Routine Practices and Additional Precautions in All Health Care Settings. 3rd edition. Toronto, ON: Queen's Printer for Ontario; November 2012.

³Vancouver Coastal Health Infection Prevention and Control. IPAC Best Practices Guideline: Aerosol Generating Medical Procedures. Vancouver, BC; March 2020.

⁴Public Health Ontario outlines routine practices as "infection prevention and control practices to be used with all clients/patients/residents during all care, to prevent and control transmission of microorganisms in all health care settings." These practices include performing routine risk assessments and hand hygiene.

Protocol for donning (i.e., putting on) PPE^{5,6} for aerosol generating medical procedures (AGMPs) during COVID-19:

Step	Considerations
1. Remove all personal items	<ul style="list-style-type: none"> • Prior to entering the patient room, ensure all personal items such as stethoscopes and ID badges are removed. • Everything that you enter the room with needs to stay in the room or be formally de-contaminated.
2. Perform hand hygiene	<ul style="list-style-type: none"> • Wrists will often be exposed as gowns can ride up the arm. • Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution). • Hand hygiene protocols should be the same as a surgical wash; wash hand surface, back, in between fingers, along each finger (including nails) one at a time, and then wrists.
3. Apply the N95 mask	<ul style="list-style-type: none"> • Please refer to the following protocol to guide your N95 mask application: <ol style="list-style-type: none"> 1. Ensure you have access to a mask that fits you appropriately based on your fit testing. 2. Remove your glasses if you wear them. 3. Hold the mask on the outside with your non-dominant hand. The straps should be hanging down. 4. Put the mask up to your face. The N95 mask manufacturer recommends putting the top strap on first. The order is not very critical for donning. 5. Make sure that the bottom strap is level to the neck, and the top strap is at the crown of your head above the ears. 6. Mold metal strip to the level of the nose. Use both hands to adjust the seal. 7. Perform a seal check. Position your un-gloved hands at the level of the eyebrows and forcibly exhale. You should not feel air. If you feel a leak, adjust the metal strip. Forcibly exhale while your hands are on the sides of the mask, and then on the bottom of the mask. If you feel a leak here, adjust the tension and position of the bottom strap. Before you enter a room, always do a seal check. Please remember that your hands/gloves and the outside of your N95 mask are considered contaminated, and therefore it is critical that you perform hand hygiene before and after touching your mask. 8. Put on your glasses if you wear them.
4. Perform hand hygiene	<ul style="list-style-type: none"> • This is especially important if you are reusing an N95 mask. • Perform hand hygiene as outlined in step 2 for a minimum of 15 seconds (or as recommended at your institution).
5. Put on eye protection	<ul style="list-style-type: none"> • Apply the protective band at the top of the face shield to your forehead; ensure that the top of the shield is resting in the middle of your forehead. The application process depends on the face shield your institution uses.

Step	Considerations
6. Put on protective gown	<ul style="list-style-type: none"> • If you are performing regular care, a level 2 gown is acceptable. • If you are performing a procedure with high risk of fluid splash, a higher level of protection (e.g., level 4 gown) may be necessary. • Have a spotter help you put the gown on. • For tall individuals with broad shoulders, ensure that the gown is not pulled too tightly when tying the strings. These individuals can also consider using a larger sized gown. • Ensure that the gown is covering as much area as possible on your back. • Tie both the neck and waist straps in a bow that will be easy to untie during doffing. Different models of gowns will have ties in different areas (e.g., at the sides instead of the back).
7. <i>(Not essential for most procedures)</i> Put on bonnet	<ul style="list-style-type: none"> • Ensure that the bonnet covers your ears.
8. Put on gloves	<ul style="list-style-type: none"> • Pull the sleeves of the gown down to the level of your knuckles and then put on gloves making sure your wrists are covered. • Do not double glove unless you are performing a procedure with high risk of contamination (e.g. intubation). The purpose of double gloves is not to further protect you, but to protect the environment and those around you.
9. Perform a final check	<ul style="list-style-type: none"> • Before entering room, ask your spotter to do a final check to ensure that your PPE is on properly. Ideally, do a 360 turn.

⁵Please note that this is the sequence used at St. Michael's Hospital. Other institutions may recommend applying the gown prior to your face protection, as outlined here: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html>

⁶In addition to the webinar content, this process was informed by: Public Health Ontario. Technical Brief: IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19. Toronto, ON: March 3 2020.

Protocol for doffing (i.e., taking off) PPE⁷ for aerosol generating medical procedures (AGMPs) during COVID-19:

Step	Considerations
1. Communicate that you are ready to doff with your spotter	<ul style="list-style-type: none"> • Tell your spotter that you are ready to doff the PPE and ask them to confirm that there is no breach to protection. • If you do not have a spotter, take a pause inside the room and “mentally rehearse” the PPE doffing process that you need to do.
2. Identify where to doff your PPE items	<ul style="list-style-type: none"> • Doff your body PPE inside of the room, away from the patient near the garbage. • Doff your facial and head PPE outside of the room, either in the antechamber (for a negative pressure room) or outside of the room.
3. (If using a gown model with a front or side tie) Untie the front of the gown (i.e., the ‘belt’)	<ul style="list-style-type: none"> • Using gloved hands, untie the front of the gown as this has been contaminated. If your gown model has a tie on the back, you will wait and untie <i>after</i> the removal of your gloves (step 6).
4. Remove gloves using glove-to-glove, skin-to-skin technique	<ul style="list-style-type: none"> • Please follow these steps to adhere to the glove-to-glove, skin-to-skin technique: <ol style="list-style-type: none"> 1. Make a cuff. i.e., with your non-dominant gloved hand, lift the outside of the gown on your dominant side and fold up the glove to make a cuff. 2. Using your dominant, gloved hand with the cuff, remove the glove on your non-dominant hand by pulling it inside out. Dispose glove straightly into the garbage. 3. Take your now bare hand and insert a finger under the cuff you have created on your dominant hand. Pull off the glove inside out. Dispose glove into the garbage.
5. Perform hand hygiene	<ul style="list-style-type: none"> • Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.
6. Remove gown	<ul style="list-style-type: none"> • Have your spotter untie the tie(s) at the back of your gown after they have removed their gloves and performed hand hygiene (i.e., steps 4 and 5). • If you are alone, make a wide movement to bring your arms back to untie. Make sure that you do not touch your face and neck. • Perform hand hygiene. • Lean forward and pinch the inside of your gown near the tie. Begin to pull the gown off your body inside out. As you are removing the gown, roll it into a ball with the contaminated side on the inside to avoid it touching your scrubs. • If you are using a Level 4 gown, dispose in garbage, If you are using a reusable yellow gown, put the gown into the appropriate pink bag.
7. Perform hand hygiene	<ul style="list-style-type: none"> • Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.

Step	Considerations
8. <i>(Not essential for most procedures)</i> Remove bonnet	<ul style="list-style-type: none"> Bonnet can be removed inside or outside of the room. Lean forward, pinch the top of the hat and pull. Put it into the garbage immediately.
9. Perform hand hygiene	<ul style="list-style-type: none"> Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.
10. Open the door and leave the room	<ul style="list-style-type: none"> N/A.
11. Perform hand hygiene	<ul style="list-style-type: none"> Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.
12. Remove face shield	<ul style="list-style-type: none"> Lean forward with eyes forward and chin up. Grab the face shield strap. Make sure that you are taking the shield strap and not the N95 strap. If discarding, drop it in the garbage. If reusing, follow your recycling policy. Unity Health Toronto has guidance on how to clean and store your face shield, which can be accessed here: https://covid.unityhealth.to/wp-content/uploads/2020/05/Cleaning-Storing-Face-Shield_20200505_1600-FINAL.pdf
13. Perform hand hygiene	<ul style="list-style-type: none"> Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.
14. Remove glasses if you have them	<ul style="list-style-type: none"> Consider having a pair of glasses specifically for the hospital if feasible. Clean your glasses if you are concerned about contamination. This typically would not be necessary unless there was considerable risk of splashing. When finished, put glasses in your scrub pocket instead of on any surfaces.
15. Perform hand hygiene	<ul style="list-style-type: none"> Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.
16. Remove N95 mask	<ul style="list-style-type: none"> Lean forward with eyes forward and chin up (i.e., looking ahead). Touch only the straps; avoid touching the surface of the mask. Remove the straps by grasping them from the back of your head. Lift off the bottom strap first, and then proceed with removing the top strap. Perform these actions with a slow, controlled motion. Either discard of the mask by touching the top strap only, or follow your recycling strategy.
17. Perform hand hygiene	<ul style="list-style-type: none"> Perform hand hygiene for a minimum of 15 seconds (or as recommended at your institution) as previously described.

⁷In addition to the webinar content, this process was informed by: Public Health Ontario. Technical Brief: IPAC Recommendations for Use of Personal Protective Equipment for Care of Individuals with Suspect or Confirmed COVID-19. Toronto, ON: March 3 2020.