



COVID-19 UPDATE

13 May 2020

MEDICLINIC GUIDELINES FOR THE AIRWAY MANAGEMENT OF THE COVID-19 PATIENT

The purpose of this guideline is to assist healthcare practitioners in minimising the risks associated with aerosol generation during the advanced airway management of a suspected or confirmed COVID-19 positive patient.

The management of the airway of a suspected or confirmed COVID-19 positive patient is high risk for both the patient and the health care practitioners involved. These patients may be unstable, requiring urgent advanced airway management. The intubation of these patients pose a high risk of contamination to healthcare practitioners as there are many opportunities for aerosol generation during the procedure. Thus the procedure requires careful planning and preparation to ensure a safe and smooth execution with minimal risk to the patient and healthcare practitioners alike. This guideline includes concepts and recommended practices for the airway management of the suspected or confirmed COVID-19 positive patient which are subject to change, as and when new information becomes available, following updates to international and South African guidelines related to COVID-19.

AEROSOL GENERATING EVENTS DURING ADVANCED AIRWAY MANAGEMENT PROCEDURES

Aerosol generating procedures are moments during a procedure that can generate extremely small liquid particles (<5µm) in the air. These aerosols can contain pathogens that can be transmitted via air currents. Thus aerosol generating events place healthcare practitioners at high risk of exposure to such pathogens and must be avoided if possible.

Examples of aerosol generating events during airway management procedures

- Bag-valve-mask ventilation with a poor seal between the patient's face and mask
- Delivery of high flow oxygen via nasal cannula
- Inducing a cough from the patient during Intubation
- Disconnections in the ventilator circuit with active airflow in the circuit

In order to minimise aerosol generation the following principles and practices are recommended.

COVID-19 INTUBATION PRINCIPLES

- As far as possible, intubations of a suspected or confirmed COVID-19 patient should take place in a dedicated intubation area/room

- The intubation area/room should be prepared and ready to receive the patient for the procedure
- The intubation should be performed by the most experienced doctor
- Video laryngoscopy is advised/preferred over direct laryngoscopy, if available
- The use of procedure checklists and/or algorithms to facilitate an organised approach
- Preparing vasoactive drugs prior to commencing procedure in anticipation of potential haemodynamic instability

The following recommendations are adapted from the South African Society of Anaesthesiologists recommendations for the airway management for COVID-19 patients (SASA, 2020).

COVID AIRWAY MANAGEMENT TEAM

Concept

- A team of doctors and nurses trained in the management of a suspected or confirmed COVID-19 positive patient's airway
- Well defined roles allocated to each team member
- Roles can be condensed according to staff availability
- Roles can be performed by staff already working in that particular unit or area

Team

- Preferably a team of 5 healthcare practitioners divided into "HOT" and "NOT" teams
- "HOT" team consists of 3 healthcare practitioners who will be inside the room performing/assisting with the intubation
- "NOT" team consists of 2 healthcare practitioners outside the room, 1 to pass additional equipment, 1 to perform the role of a runner

Team Members Roles:

1. **HOT- 1 – Airway operator (The most experienced Doctor):** Performs 2-handed seal on Bag-Valve-Mask (BVM) face mask, performs intubation, provides manual ventilation once ETT is secured, performs Front of Neck Airway (FONA) if necessary
2. **HOT-2 – Airway assistant (2nd Doctor or Registered Nurse):** Provides ventilations for 2-person BVM ventilation, passes airway operator the necessary equipment during intubation procedure, secures the endotracheal tube (ETT)
3. **HOT-3 – Drugs and Monitoring (Registered Nurse or Enrolled Nurse):** Monitors patient's haemodynamic status, administers drugs, manages situational needs
4. **NOT-1 (Enrolled Nurse or Enrolled Nurse Auxiliary):** Manages and provides 'rescue' and/or additional equipment for the HOT team, coordinates the activities of the runner, donning and doffing buddy for HOT team members
5. **NOT-2 (Enrolled Nurse Auxiliary or Care Worker):** Acts as a runner, fetches additional equipment and handles communication with multidisciplinary team as needed

Team Member PPE:

1. **HOT- 1 – Aerosol Generating Precaution / Airborne Precaution PPE –** goggles/face visor, N95 respirator, gown, gloves
2. **HOT-2 – Aerosol Generating Precaution / Airborne Precaution PPE –** goggles/face visor, N95 respirator, gown, gloves

3. **HOT-3** – Aerosol Generating Precaution / Airborne Precaution PPE – goggles/face visor, N95 respirator, gown, gloves
4. **NOT-1** – Contact/droplet precaution PPE – goggles/face visor, surgical mask, apron, gloves
5. **NOT-2** – Surgical mask

COVID PREPARATION

Preparation for the procedure is key to a smooth and uncomplicated intubation with minimal contamination to staff, the environment and stock/equipment. The following preparations are recommended.

Room prep

- If possible intubate patients in a negative pressure isolation room
- If negative pressure is not available, then a well-ventilated isolation room

COVID-19 Trolley Prep

In order to minimise contamination of unused stock resulting in unnecessary wastage and cost, the use of “HOT” and “NOT” trolleys with prepacked equipment packs is advised. The trollies allow for the transportation of all the intubation stock and equipment to the area where the patient is being intubated, decreasing patient movement throughout a unit and thereby decreasing environment contamination. The pre-packed packs facilitate easy preparation for the procedure, organised execution as well as saving valuable time.

COVID-19 “Hot” and “Not” trolleys

Concept

- 2 steel trolleys: 1 “HOT” and 1 “NOT” , stocked, ready for use and stored in a central area for easy access
- “NOT” trolley: stocked with all the pre-packed equipment packs (see pack specifics below) – remains outside the intubation room (uncontaminated)
- “HOT” trolley: will have only essential items required for intubation packed out onto it – goes into the intubation room (contaminated)
- All “HOT” disposables will be discarded inside the room
- All “HOT “ non-disposable equipment – decontaminated according to MCSA IPC guidelines
- “HOT” trolley is decontaminated after use according to MCSA IPC guidelines

COVID-19 Packs

Concept

- All stock/equipment is checked and pre-packed in clear plastic bags with attached checklist
- Only essential stock/equipment is taken into “HOT” zone, additional packs can be passed in by NOT-1 assistant as needed
- All unused, uncontaminated stock/equipment can be repacked into packs post intubation
- All packs are to be rechecked and repacked immediately post intubation in preparation for next intubation

Packs

- **PPE pack:** 3 x airborne, 1 x droplet precautions
- **Intubation pack:** intubation essentials
- **Drug pack:** non-schedule / non-refrigerated drugs
- **Rescue pack:** rescue airways
- **Cleaning kit**
- **Monitoring bag**
- **Optional additional packs**

(See checklists for full stock requirements)

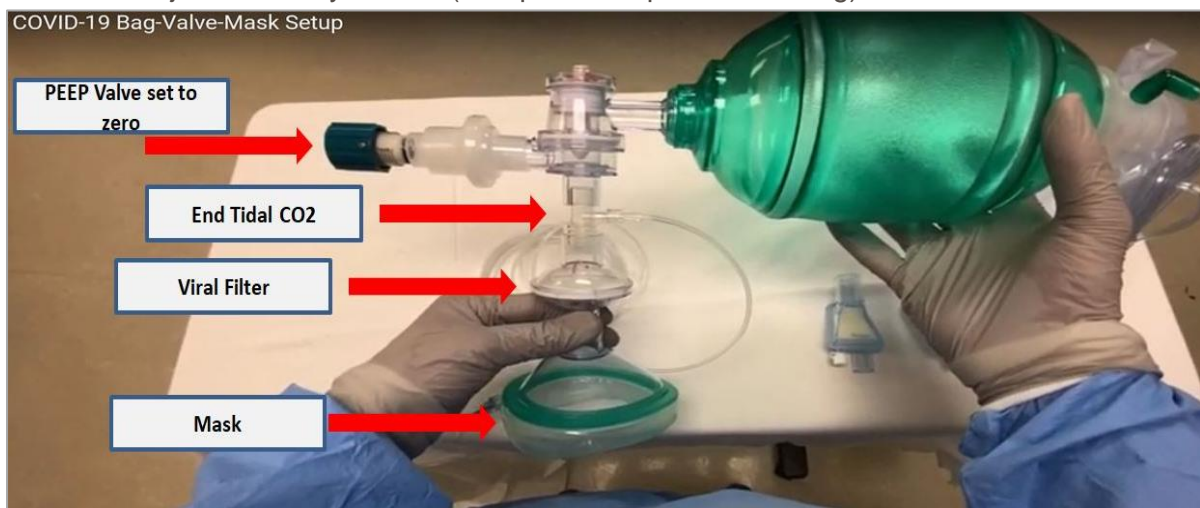
PROCEDURE PREP

“Cold” prep

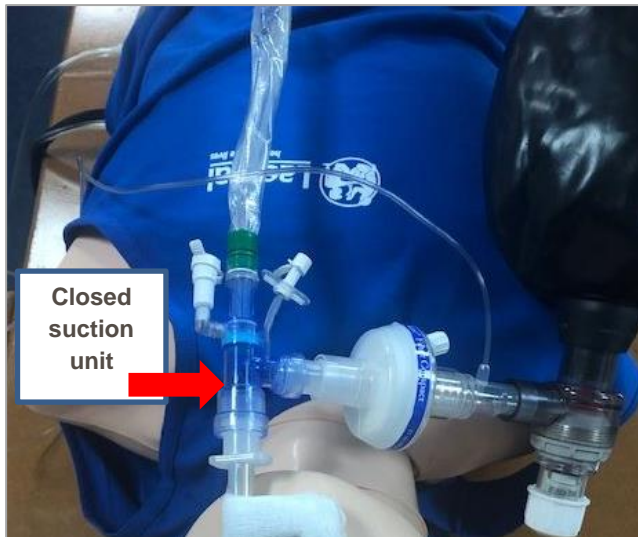
- Preparation of the COVID-19 trollies and packs – check at the beginning of each shift and restocked and check after every intubation
- All packs are packed and checked against checklist and stored on “NOT” trolley, ready for use
- “Hot” trolley is clean and free of equipment, ready for use

“Warm” prep

- Both trollies with all equipment are moved to the outside of intubation room
- Essential intubation stock and equipment is unpacked onto the “HOT” trolley
- BVM circuit is preassembled (see BVM circuit setup image below)
- Patient specific drugs are assembled
- Video Laryngoscope is ready for use (if available)
- PPE adjunct is ready for use (Perspex box / plastic sheeting)



BVM circuit: mask, bacterial/viral filter, capnography, Bag-Valve – Resuscitator with PEEP valve set to Zero. (The Gurney Room, 2020)



Closed suction should also be attached between the mask and capnography as part of the BVM setup provided it fits the mask.

PRE-INTUBATION TEAM PREP

Roles and Responsibilities

- Assemble team and assign roles
 - HOT-1: Airway 1
 - HOT-2: Airway 2
 - HOT-3: Drugs and monitoring/dynamics
 - NOT-1: Equipment
 - NOT-2: Runner and communication
- Confirm equipment is ready
- Confirm procedure plan according to procedure checklist
- Don appropriate PPE
- “HOT” team move into intubation room with “HOT” trolley and essential airway equipment
- NOT-1 remains outside of the room by the door
- Not-2 remains outside away from the door

Procedure Performance

Prepare environment

- BVM Circuit (with closed suction attached if it fits the mask or immediately available) ready and connected to oxygen
- Suction tubing connected to Yankauer within reach and switched on

Prepare the patient

- Position patient, attach monitoring, ensure working IV access
- Pre-oxygenate using appropriate strategy (see pre-oxygenation strategies below) for 3-5 minutes minimum
- HOT-1 states airway plan to HOT-2
- HOT-2 confirms with HOT-1 all equipment is prepared

- HOT-3 confirms with HOT-1 and HOT-2 that monitoring is in place, IV is patent
- HOT-3 confirms with NOT-1 that rescue bag is ready

Perform Rapid Sequence Intubation (RSI)

- RSI is recommended to decrease apnea time and reduce the need for BVM ventilation (aerosol generation risk)
- Administer sedation/induction drug, followed by the neuromuscular blocker
- Ensure neuromuscular blockers have taken full effect before attempting intubation to reduce aerosol production from coughing (45 seconds post neuromuscular blocker administration or visualized muscle fasciculation)
- Turn off oxygen before removing mask from patient's face
- **Plan A:** perform video/direct laryngoscopy with ETT preloaded with bougie/introducer
 - If intubation unsuccessful – call for rescue bag and move to Plan B
- **Plan B:** Insert a 2nd generation Supraglottic Airway (SGA) e.g. iGel
 - If SGA failure / not effective move to Plan C
- **Plan C:** BVM with 2–handed-2-person technique (HOT-2 assists with bagging).
 - If unable to ventilate with BVM move to Plan D
- **Plan D:** perform FONA

Pre-oxygenation strategies

PRE-OXYGENATION STRATEGY	REQUIREMENTS	METHOD	RATIONALE
Passive ventilation via face mask or BVM	<ul style="list-style-type: none"> • Patient with spontaneous respirations • Rebreather mask • BVM 	<ul style="list-style-type: none"> • Position the patient in semi-high fowlers or supine (patient dependent) • Provide high flow oxygen via the chosen device • If a BVM is used do not provide active ventilations via the BVM • The patient pre-oxygenates with their own spontaneous breaths 	Active BVM ventilation increases the risk of aerosol generation if the seal with the mask is poor. By decreasing the need for active ventilations via the BVM we decrease the risk for aerosol generation.
Apneic oxygenation	<ul style="list-style-type: none"> • Apneic patient • Nasal cannula • BVM with 2-handed seal to minimise air leakage 	<ul style="list-style-type: none"> • Position the patient supine • Apply nasal cannula with oxygen flow of 5 liters/minute 	Provides positive pressure to the airways, inflating the lungs and oxygenating the patient without active

		<ul style="list-style-type: none"> • Position BVM with 2-handed seal and apply firm jaw-thrust • Turn oxygen flow for BVM up to 15 liters/min 	BVM ventilation, thus reducing aerosol generation.
BVM ventilation	<ul style="list-style-type: none"> • Apneic / bradypneic patient • BVM with 2-handed seal to minimise air leakage 	<ul style="list-style-type: none"> • Position the patient supine • HOT-1 positions BVM with 2-handed seal and applies a firm jaw-thrust • HOT-2 provides active ventilations via the Bag-Valve-Resuscitator 	BVM ventilation poses a high risk for aerosol generation if air leaks out from the sides of the mask. Thus BVM ventilation must be kept to a minimum where possible. If BVM ventilation is necessary, a tight seal between the mask and the patient's face must be ensure by making use of the 2-handed seal as shown in the image below.

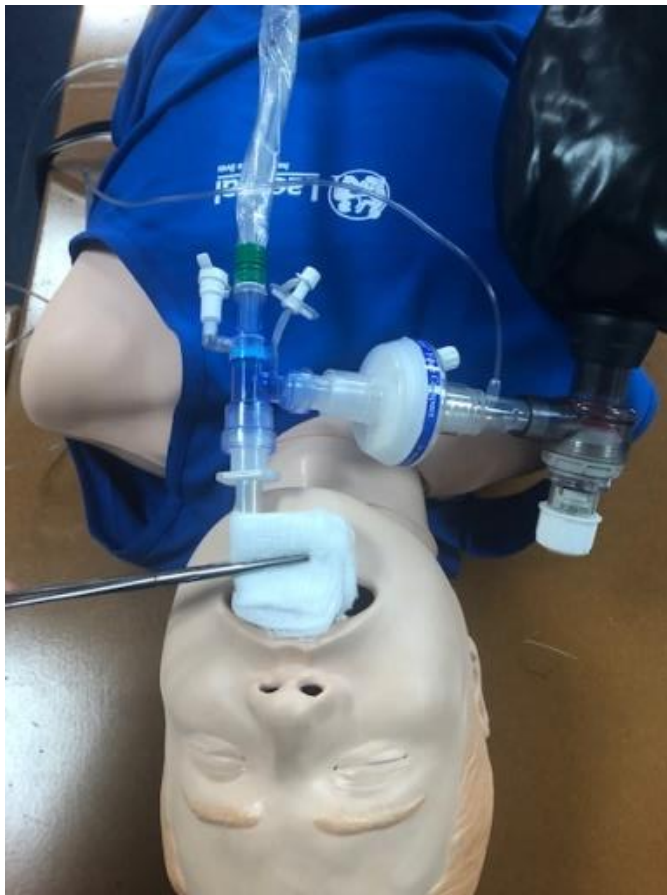


2-handed-2-person BVM technique: HOT-1 (airway operator) seals the masks to the patient's face with two hands while HOT-2 (airway assistant) provides manual ventilation by squeezing the bag of the BVM. (The Gurney Room, 2020)

Post intubation

- Securing and confirming the airway
 - Immediately after passing the ETT, connect the closed suction catheter and BVM circuit
 - Inflate the ETT cuff

- Turn on the Oxygen supply and manually ventilate the patient
- Confirm placement with capnography and equal chest rise (auscultation difficult and unreliable over PPE)
- Secure the airway and record the depth of the ETT
- Connecting the patient to the ventilator
 - HOT-2: Prepare the ventilator with desired mode and settings and place on standby
 - HOT-1: clamps the ETT and hold ETT securely
 - HOT-2: turns off oxygen flow to BVM and disconnects from capnography
 - HOT-2: connects ventilator circuit to capnography
 - Hot-1: unclamps ETT
 - HOT-2: takes ventilator off of standby and commences mechanical ventilation



- Clamping the ETT with gauze and forceps (preferably plastic to protect the integrity of the ETT)
- Completing the case
 - HOT-1 (Doctor) leaves if no longer required and doffs according to MCSA IPC guidelines
 - HOT-2 (Registered Nurse) remains in the room to continue with patient care
 - HOT-3 remains to assist HOT-2 as needed or disposes of used stock and cleans equipment according to MCSA IPC guidelines, then leaves the room and doffs according to guidelines

PROCEDURE CHECKLIST	
Team Prep	
Roles allocated (3 HOT, 2 NOT)	
Personal items (cell phones, keys etc.) handed to NOT 2 for safe keeping	
Team Donn PPE	
NOT 1 performs PPE buddy check for HOT team members	
Names and roles displayed on PPE (stickers/marker pen)	
Equipment Prep	
Essential intubation supplies unpacked on "HOT" trolley	
BVM circuit preassembled	
Drugs drawn up on "HOT" trolley	
Rescue bag check and sealed, ready if needed and kept on "NOT" trolley	
Video Laryngoscope ready (if available)	
Patient Prep	
Patient in optimal position	
Monitoring in place	
Patent intravenous access	
Check BVM circuit assembled correctly (with closed suction if available)	
Yankhour and suction tubing connected and working	
Position PPE adjunct as necessary	
Commence 3-5 min preoxygenation using applicable preoxygenation strategy	
Induction and Intubation	
HOT-1 states the airway plan (ABCD)	
HOT-2 confirms equipment available and ready	
HOT-3 confirms with NOT-1 that rescue pack is available and ready	
HOT-3 administers RSI drugs	
HOT-1 confirms neuromuscular blockades have taken effect	
HOT-2 switches off oxygen before removing the BVM from the patient's face	
Endotracheal intubation performed by HOT-1 (airway rescue performed as needed)	
HOT-1 confirms ETT depth	
HOT-2 inflates ETT cuff and connects closed suction and BVM circuit	
HOT -2 turns on oxygen and provides manual ventilation	
ETT placement confirmed with bilateral chest rise and capnography	
Post Intubation	
ETT secured at stated depth	
Ventilator connected to commence mechanical ventilation	
Additional lines and tubes placed as needed (CVP, A-line, NG tube)	
Chest x-ray arranged	
Case Completion	
Additional team members leave as necessary	
Doffing done according to MCSA IPC guidelines	

PPE-PACK CHECKLIST	
3 sets of airborne precaution PPE (for "Hot" team members)	
1 set of droplet precaution PPE (for "Not 1" team member)	
Donning and doffing poster	
Sticker labels and marker pen	
INTUBATION PACK CHECKLIST	
Oropharyngeal airways (OPAs) (size 4/5 for adults)	
Bag-valve-Mask Resuscitator (BVMR) with PEEP valve	
BVM mask (various sizes)	
Bacterial/viral filter	
End-tidal CO2 monitoring device	
Oxygen tubing	
Yankhaur	
Suction tubing	
Closed suction catheter system	
Endotracheal tubes 6.0 – 8.0 (take only preferred size into the room)	
Subglottic secretion drainage ETT 7.0 – 8.0 (take only preferred size into the room)	
Disposable bougie or ETT rigid introducer	
Lubricating gel	
Video Laryngoscopy (preferably disposable)	
Direct Laryngoscopy handle and blades (Mac 3 and 4)	
ETT securing device/tape	
10 mL syringe	
ET tube clamp and gauze (artery forceps –preferably plastic)	
Scissors	
PPE adjunct (perspex box or plastic cover)	
Drug pack Checklist	
Syringes (2ml, 5ml, 10ml, 20ml, 50ml)	
Needles	
Webcols	
Medication labels	
Non Schedule drugs	
Rescue Pack Checklist	
2nd generation Supraglottic Airway (SGA) e.g. iGel 3 and 4	
Emergency cricothyroidotomy set	
ET tube size 6.0	
Cleaning Kit Checklist	
Surface disinfectant (hypochlorite solution)	
Alcohol hand rub	
Bowl/ receiver for contaminated equipment requiring cleaning, high level disinfection or sterilisation	
Plastic bags (clear/yellow/red)	
Monitoring Bag (if not available in the patient's room)	
Portable monitor with NIBP, Pulse, SATS, ECG and ETCO2 monitoring capabilities	
Optional Additional Packs	
Nasogastric tube insertion pack	
Urinary catheter insertion pack	
Invasive line (CVP, dialysis, arterial line)	

List of abbreviations

BVM: Bag-Valve-Mask

FONA: Front of Neck Airway

SGA: Supraglottic Airway

ETT: Endotracheal tube

PPE: Personal Protective Equipment

MCSA IPC: Mediclinic Southern Africa Infection Prevention and Control

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