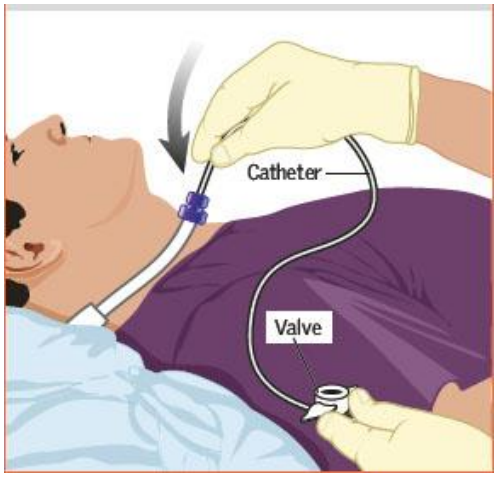
SOP FOR ENDOTRACHEAL SUCTIONING OF INTUBATED PATIENTS



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Approval Form

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STANDARD OPERATING PROCEDURE FOR ENDOTRACHEAL SUCTIONING OF INTUBATED PATIENTS			
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PEER REVIEW

Dr. M. Klompas (Infectious Disease Physician and Hospital Epidemiologist – USA).

This standard operating procedure was sent to the Consultants-in-Charge of Anesthesia of Mauritius for review.

This document was reviewed by the IPC teams in October 2023 and no changes were recommended – this version is being extended to 2026.

Date of next review: Dec 2026

Standard Operating Procedure for Endotracheal Suctioning of Intubated Patients

Challenges faced

The rate of ventilator-associated pneumonia (VAP) in the public hospitals of Mauritius is higher than that found in many other countries.[1] Unhygienic endotracheal suctioning may be contributing to this issue.

During multiple Infection Prevention and Control visits of intensive care units, it was noted that open suctioning (as opposed to closed suctioning) was the norm, the same suctioning catheter was being used for several days on a patient, subglottic drainage port was not being utilized, the catheter was being flushed with non-sterile normal saline that was left open to the air for many hours, if not days, catheters were not cleaned before reuse and the suction connection tubing was often brown in color after being used for a few months without any evidence of being sterilized or disinfected in between patients.

Purpose

This standard operating procedure delineates the correct steps that should be followed when suctioning intubated patients so as to reduce the rate of VAP in the country.

Key points

1. While the current evidence does not point towards a drop in VAP with the use of closed suctioning[2], to avoid transmission of microbes to healthcare workers, closed suctioning is generally preferred in patients with pulmonary infections (at the risk of being costlier). Moreover, the use of closed suction is suggested for adults with a high fraction of inspired oxygen (FiO_2), or an elevated positive end-expiratory pressure, or at risk for lung de-recruitment, and for neonates.[8]

2. Shallow suctioning (i.e., up to the length of the tracheostomy tube + 0.5cm) is preferred over deep suctioning (i.e., up to the carina) in order to minimize trauma. Trauma can dislodge bacteria which itself is a risk factor for infection.

3. The suction catheter that is used should occlude less than 50% of the lumen of the endotracheal tube in children and adults, and less than 70% in infants.[8] Recommended sizes are shown in the following table.

Age	Tracheostomy tube size (inner diameter in mm)	Recommended suction catheter size (Fr)
Infant	2.5 – 4	5 - 8
Child	4 – 6	8 - 10
Adult	7 - 10	10 – 12

4. Tracheal instillation with normal saline before suctioning is not necessary.[3, 14] However, it may be used to loosen thick, tenacious secretions.[12]

5. Artificial airways should never be suctioned at regular intervals, because of the risk of tracheal injury when secretions are not retained within the airways.[4] Instead, the need for suctioning should be reassessed every few hours.

6. While single use is preferred, catheters used for open suctioning should not be used beyond 24 hours or they should be replaced at any time when contaminated (for instance, by being dropped on the bed or floor) or when blocked by secretions.[5, 6]

7. Much controversy exists regarding whether suctioning is a clean procedure or a sterile procedure. However, a sterile technique is encouraged especially during open suctioning.[8]

8. To clear any residual debris or secretions from the catheter, suction a small amount of distilled / sterile water (or sterile normal saline) with the suction catheter.[7, 13]

    a. The water can be poured into a kidney dish or cup for suctioning.

    b. Once the bottle is opened, the water in the container is no longer considered sterile.

    c. If the bottle will be reused, (a) close the bottle after use, (b) do not dip the catheter in the bottle's content and (c) label the bottle with the time and date of opening and do not reuse it more than 8 hours after opening.

    d. Per the US CDC, it is preferable to use only sterile fluid to remove secretions from the suction catheter if the catheter is to be used for re-entry into the patient's lower respiratory tract.[17]

9. Consider the use of endotracheal tubes with subglottic secretion drainage ports for patients expected to require more than 48–72 hours of mechanical ventilation.[22]

10. Despite the manufacturer's recommendations to change the in-line closed airway suctioning catheters frequently or even daily, there is no evidence of patient harm if they are used until malfunctioning, normally allowing for use of a single catheter for one week or more.[4, 9] However, do not reuse the same catheter on different patients.

11. Following the suctioning event, hyper-oxygenation for at least one minute by following the same technique(s) used to pre-oxygenate the patient may be used, especially in patients who are hypoxemic before and / or during suctioning.[8] Beware of the risk of oxygen toxicity.

12. In the hospital setting, always clean open suctioning devices before every reuse.[7] If the patient is in a nursing home or on a ventilator at home, the suction catheter should be cleaned at least once daily.[10]

13. Change suction tubing every week. Clean suction cannisters at least twice a week, if not daily, and disinfect them at least once a week; the steps to follow are similar to the ones described below for the cleaning and disinfection of suction catheters.[11]

14. It is preferable to have two nurses to perform the suctioning procedure – one to do the actual suctioning and the other to assist by supporting the suction tube, helping with manual ventilation if necessary or to pass the sterile normal saline to clean the catheter.[5]

Indications for endotracheal suctioning[8]

1. Presence of coarse crackles on auscultation of the chest – this suggests that secretions may be found in the airways

2. Visible secretions in the endotracheal tube or in the patient's mouth

3. Raised peak pressure on the ventilator for patients on volume-controlled ventilation mode, or fall

in tidal volume for patients on pressure-controlled ventilation mode – this suggests possible obstruction of the airways by a mucus plug

4. Observation of a saw tooth pattern on the airway pressure waveform – this indicates the presence of fluid in the airways
5. Acute respiratory distress or hypoxia
6. Suspected aspiration of gastric or upper-airway secretions
7. Sampling for microscopy, culture & sensitivity

Open and closed suction catheters

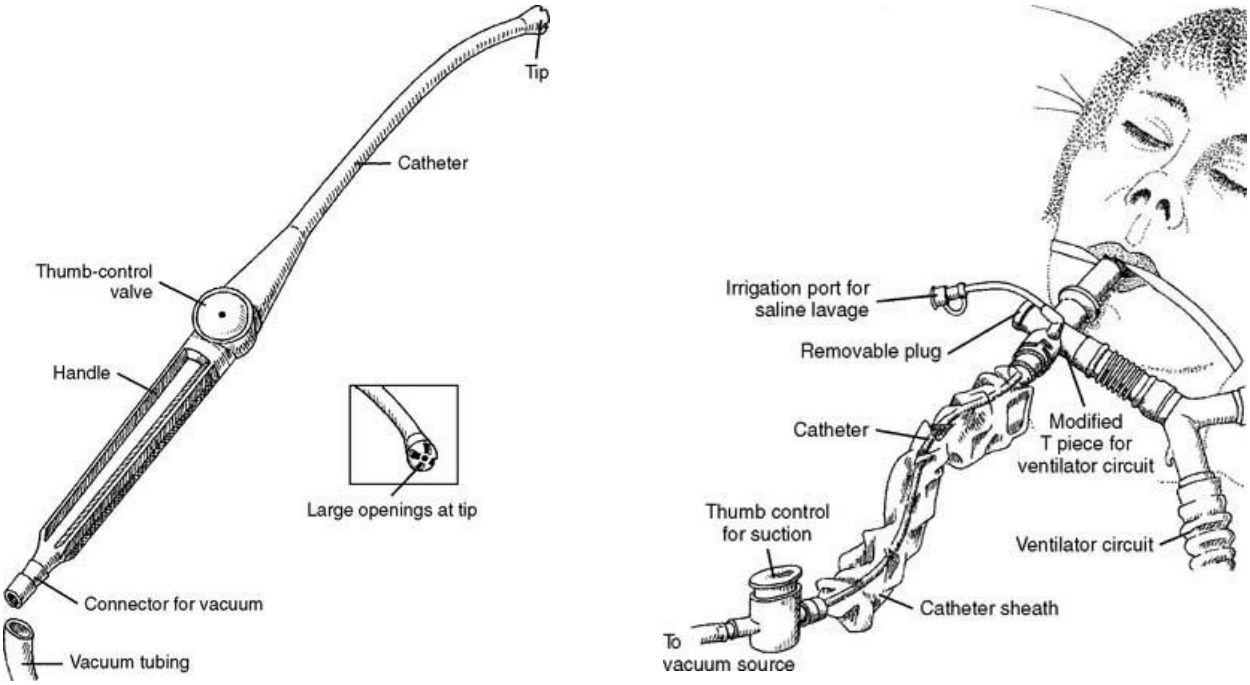

Figure 1: Features of the Yankauer suction catheter which is used for open suctioning and of the self-contained catheter with sheath suctioning system for closed-airway suctioning. Taken from reference 18 as listed in the main text.

Steps to be followed for suctioning[7, 8, 13, 15]

Open circuit suctioning

1. Position patient properly, with head & neck well supported. Ensure all equipment required for the procedure is present. Usually, the head of the bed is elevated to 30°.
2. Perform hand hygiene.
3. Don the appropriate personal protective equipment (PPE): put on sterile gloves and wear a surgical mask. If the patient is infected with an organism that can be transmitted via droplets or via aerosols, since suctioning is an aerosol generating procedure, wear an N95 / FFP2 / FFP3 instead of a surgical mask.
4. Turn on the suction apparatus and set the vacuum regulator to the appropriate negative pressure. Adjust the suction pressure to negative 100 to 140 mmHg in adults, negative 60 to 80 mmHg in infants, or use the minimum pressure effective in clearing the secretions.

5. Determine the target suction depth.
6. Peel open the suction catheter end and attach it to the suction tubing.
7. Increase the FiO_2 by 10%-20% above baseline for 1-2 minutes.
8. Disconnect the ventilator circuit.
9. Insert the suction tube through the endotracheal tube.
10. Utilizing a non-touch technique gently introduce the suction catheter tip to the pre-measured depth. Do not apply pressure when introducing the suction catheter inside the endotracheal tube (i.e., the suction vent should not be covered by the thumb), as this can increase the risk of mucosal damage and hypoxemia.
11. Initiate continuous aspiration with rotatory movements while removing the catheter. The duration of each suctioning event should be no more than 15 seconds.
12. Assess the patient's respiratory rate, skin color and / or oximetry reading to ensure the patient has not been compromised during the procedure and following the procedure.
13. Repeat the suction as indicated by the patient's individual condition.
14. In between each suction pass, flush the suction catheter, by dipping it into a cup or kidney dish filled with distilled water or sterile normal saline (do not use tap water). Empty the contents of the catheter into a collecting basin.
15. Reconnect the ventilator circuit.
16. Keep the suction catheter in a container used to store dirty equipment. It must be cleaned before reuse later on.
17. Doff the PPE.
18. Perform hand hygiene.

Close circuit suctioning

1. Position patient properly, with head & neck well supported. Ensure all equipment required for the procedure is present. Usually, the head of the bed is elevated to 30°.
2. Perform hand hygiene
3. Don the appropriate PPE: put on disposable gloves and wear a surgical mask. If the patient is infected with an organism that can be transmitted via droplets or via aerosols, since suctioning is an aerosol generating procedure, wear an N95 / FFP2 / FFP3 instead of a surgical mask.
4. Turn on the suction apparatus and set the vacuum regulator to the appropriate negative pressure.
5. Determine the target suction depth.
6. Connect the tubing to the closed suction port.
7. Increase the FiO_2 by 10%-20% above baseline for 1-2 minutes.

8. Gently push the suction catheter through the suction port, to the pre-measured depth, without applying suction. Allow the plastic sleeve to slide back over catheter, as the suction catheter is advanced through the endotracheal tube.
9. Apply suction by depressing the suction button. Apply continuous suction for no more than 15 seconds as you withdraw the catheter into the sterile sleeve of the closed suction sleeve.
10. Repeat steps above if needed, depending on patient's individual condition.
11. Flush the closed suction tubing with distilled water or sterile saline (do not use tap water) via the flush port and empty the liquid into a receptacle.
12. Disconnect the suction tubing and replace the cap.
13. Doff the PPE.
14. Perform hand hygiene.

Steps to clean and disinfect the open suction catheter[7, 16, 19]

1. Perform hand hygiene
2. Wear the recommended PPE i.e., non-sterile gloves and as per the risk assessment, eye protection and / or gown.
3. Whenever the suction catheter is to be reused, place the catheter in a container of distilled / sterile water and apply suction for approximately 30 seconds to clear secretions from the inside.
4. Then, soak the catheter in soapy water for a few minutes. The water used should be sterile or distilled (do not use tap water).
5. Next, rinse the catheter with sterile water for a few minutes. Then soak it in a solution of 3% hydrogen peroxide for 10-15 minutes.
    a. If this is not available, use ≥ 10% ethanoic acid (white vinegar) for 15 minutes.[20, 21] The effect of vinegar on viruses is questionable and under study. Its mycobactericidal effect requires a prolonged contact time.
6. Rinse the catheter in cool distilled water and air-dry on a clean surface.
7. Store the catheter in a clean airtight container.
8. Do not reuse catheters if they become stiff or cracked.

Schedule of maintenance[11]

Suction Equipment & Recommended Schedule of Maintenance			
Equipment or Supplies	✓ **DAILY**	✓ **WEEKLY**	✓ **MONTHLY**
Suction machine	Wipe outside surface	-	Check batteries- expect to replace at least annually
Suction canisters	Empty into toilet. Wash with warm soapy water & rinse well. Leave small amount of H2O in canister to prevent sticking of mucous	Clean at least once per week	
Suction catheters	Single use- replace daily	-	
Suction Tips	Rinse after each use	Replace	
Suction Tubing	Inspect	Disposable- replace	
Machine Filters	Inspect	-	Inspect and change if looks dirty or every 2 months at a minimum
Water for suctioning	Empty into separate cup or container- **do not** reuse dirty H2O	-	
Cup or container for rinsing catheters	Clean or dispose and replace daily	-	

Do not use tap water for suctioning – use sterile or distilled water.

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