Aerosol generating procedures are associated with high droplet and particle generation, placing healthcare providers at increased risk for transmission of respiratory viral infections. Tracheostomy is a procedure that should be performed on the COVID-19 patient only when the benefits outweigh the risks, and when adequate PPE and staff preparation is available. There is increased risk of exposure during the surgical procedure. There is also increased potential for virus exposure to the team who perform evaluations and ongoing care with suctioning, dressing changes and other routine post-tracheotomy activities. The reason is the greatest concentration of virus is in the patient’s respiratory tract. Tracheostomy and, once in place, ongoing care of the tracheostomy site would be classified as aerosol generating procedures.

Commonly performed medical procedures that are often considered AGPs, or that create uncontrolled respiratory secretions, include:

- Open suctioning of airways
- Sputum induction
- Cardiopulmonary resuscitation (chest compressions)
- Endotracheal intubation and extubation
- Placing or changing tracheostomy tubes
- Non-invasive ventilation (e.g., high flow nasal cannula, BiPAP, CPAP)
- Bronchoscopy
- Manual ventilation
- Chest physiotherapy
- Nasogastric tube placement
- Nebulizer administration: Aerosols generated by nebulizers are derived from medication in the nebulizer. It is uncertain whether potential associations between performing this common procedure and increased risk of infection might be due to aerosols generated by the procedure or due to increased contact between those administering the nebulized medication and infected patients (use MDI unless contraindicated).

Tracheostomy considerations relating to SARS-CoV-2 include:

- Tracheostomy is not recommended in patients who still need high fractions of inspired oxygen, have high ventilator requirements, and might require prone positioning as part of their ventilatory strategy (McGrath, B., 2020)
- If available, plan for sufficient time to order and receive results of testing for SARS-CoV-2 prior to performing the tracheostomy. Unless emergent, surgical procedures should only be undertaken after ascertaining COVID-19 status.
- Avoid tracheotomy in COVID-19 positive or suspected patients during periods of respiratory instability or heightened ventilator dependence.
- If COVID-19 negative test results, proceed as per standard operating procedure (fluid resistant surgical mask, surgical gown, gloves and eye protection)
• If no testing or results not available (PUI) treat as if positive for COVID-19 (see PPE Guide https://www.mercyone.org/assets/documents/newsletter/covid-19/covid19-ppe-guide-booklet-9.9.20.pdf)
• Obtain consult as available to discuss risk/benefits/alternatives of tracheostomy in COVID-19 positive patient.
• If safe for the patient, perform the tracheostomy in the patient’s room being used for isolation – ideally in an airborne infection isolation room (AIIR). If the patient is not currently in an airborne infection isolation room, but a tracheostomy is needed, transfer to this type of room and continue isolation in this room after procedure and throughout the remainder of the patient’s admission.

ICU/ED Bedside Tracheostomy

• Bedside tracheostomies in the ICU should be well-orchestrated events, meticulously planned and rehearsed.
• Specific considerations include the limited space in the ICU room, suboptimal positioning of the patient, and the movement of essential equipment and surgical instruments.
• If possible, consolidate all necessary equipment and instruments into as few sterile packs as possible.
• Exposure Time: The time of exposure to aerosolized secretions intraoperatively should be minimized. This may be achieved by (1) ensuring complete paralysis of the patient throughout the procedure to prevent coughing, (2) stopping mechanical ventilation just before entering into the trachea via tracheotomy, and (3) reducing the use of suction during the procedure. If suction is used, this should be within a closed system with a viral filter.
• In this regard, percutaneous tracheostomy involves more extensive airway manipulation, such as bronchoscopy and/or serial dilations during trachea entry. Patients with high ventilatory settings may also require repeated connection and disconnection from the ventilatory circuit. These factors result in increased aerosolization risks compared with open tracheostomy, in which entry into the trachea is performed quickly with an incision and aerosolization risks are mitigated with the aforementioned measures. As such, open tracheostomies were favored over percutaneous tracheostomies during the original SARS outbreak in 2003.

Surgical Tracheostomy

• Refer to Operative and Other Invasive Procedures for PUI or COVID-19+ Patients (https://www.trinity-health.org/covid-19-resources/assets/documents/clinical-guidance/patient-care/operative-and-other-invasive-procedure-guidance.pdf) for details on planning for the surgical procedure including PPE for the surgeon and perioperative team if the tracheostomy needs to be performed in the operating room.
• Reduce unnecessary team members only to those that are essential in the OR suite, OR if urgent, in the ED. All others remain outside the closed door.
• Once complete, an HME should be placed on the tracheostomy to reduce shedding of the virus should the anesthetic tubing become disconnected. Avoid disconnection of the HME.
## PREPARATION (Day of Procedure)

### Check
- Ensure PPE is available for all staff
- Take tracheostomy grab bag and check contents – tracheostomy set, **cuffed non-fenestrated** tubes of appropriate sizes and HME with viral filter
- Confirm designated staff are available and prepared (Anaesthetic, ENT, and scrub team)

### Confirm
- Indication and appropriateness of tracheostomy to be reconfirmed and documented
- Consider whether the patient is relatively stable and will tolerate laying flat with periods of brief apnoea

### Briefing

*To include but not limited to*
- Airway management steps generic to tracheostomy
- Steps particular to COVID tracheostomy (see additional documents from ENT UK and page 5)
- Request full paralysis throughout to reduce risk of cough

### Equipment
- Don PPE and perform “buddy check”
- Lay out tracheostomy equipment including tube
- Attach syringe to tracheostomy balloon ready for inflation
- Consider preloading the HME onto the inner tube
- Ensure only closed in-line suction is used for ETT and tracheostomy tube
- Consider use of surgical ties rather than diathermy to prevent vapour plumes containing viral particles

### Patient
- Confirm readiness with surgeons, runner, nursing, anaesthetic team
- **Only now send for the patient**
# PERFORMANCE (Once trachea is exposed)

<table>
<thead>
<tr>
<th>Step</th>
<th>Instructions</th>
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<tbody>
<tr>
<td><strong>Pause</strong></td>
<td>Inform anaesthetist of readiness to open trachea&lt;br&gt;Confirm paralysis&lt;br&gt;Pre-oxygenate with PEEP then stop ventilation and turn off flows&lt;br&gt;Allow time for passive expiration with open APL valve</td>
</tr>
<tr>
<td><strong>Advance</strong></td>
<td>Consider clamping ETT then advance cuff beyond proposed tracheal window&lt;br&gt;Hyperinflate cuff and re-establish oxygenation with PEEP&lt;br&gt;When adequately oxygenated, communicate clearly and cease ventilation prior to opening the trachea</td>
</tr>
<tr>
<td><strong>Tracheal window</strong></td>
<td>Create tracheal window taking care to avoid the ETT cuff&lt;br&gt;Turn off flows with open APL valve, allow passive expiration, consider clamping ETT&lt;br&gt;Deflate ETT cuff and draw back proximal to the tracheal window under direct vision&lt;br&gt;Ensure window is of sufficient size to allow easy insertion of tracheostomy tube without injury to cuff&lt;br&gt;Insert cuffed, non-fenestrated tracheal tube</td>
</tr>
<tr>
<td><strong>Circuit connection</strong></td>
<td>Immediately inflate tracheostomy tube cuff&lt;br&gt;Replace introducer with non fenestrated inner tube and HME&lt;br&gt;Prompt attachment of circuit&lt;br&gt;Resume ventilation</td>
</tr>
<tr>
<td><strong>Confirmation</strong></td>
<td>Confirm position of the tube in a 30 degree head up (ICU nursing) position&lt;br&gt;Confirm position with end-tidal CO2 only (avoid contamination of stethoscope by auscultation)&lt;br&gt;Withdraw clamped ETT carefully</td>
</tr>
<tr>
<td><strong>Secure</strong></td>
<td>Secure tube with sutures and tracheostomy tapes&lt;br&gt;Use appropriate dressing&lt;br&gt;Doffing of PPE with “buddy check” in appropriate area with disposal of equipment as per local guidelines&lt;br&gt;Decontaminate theatre using local infection control guidance</td>
</tr>
</tbody>
</table>
**POST-PROCEDURE (ICU and beyond)**

**First week**
Exercise extreme care in transfer  
One dedicated team member allocated to holding tracheostomy tube whenever being proned or turned  
Humidified oxygen to be avoided if possible, HME only

**Nursing care**
Use only in line closed suction circuits at all times  
Periodic check of cuff pressures  
Cuff should not be deflated without considering risks to patient, staff and the environment.  
Do not change dressings unless frank signs of infection

**First tube change**
Delay first tube change to 7-10 days  
Full PPE  
Perform same sequence of pause in ventilation with flows off before deflating cuff and inserting new tube with immediately re-inflation of cuff and reconnection of circuit

**ICU stepdown**
Ideally to a dedicated COVID tracheostomy ward with trained nursing staff  
Cuffed non-fenestrated tube to be used until the patient is confirmed COVID negative  
Subsequent planned tube changes at 30 day intervals

**Decannulation**
If patient is confirmed COVID negative and is to be moved to a COVID negative ward then consider trials of cuff deflation  
Readiness for decannulation should be made with close liaison with SLT and physiotherapy

Post-tracheostomy:

- Because of the risk of viral transmission, patients should be managed by experienced colleagues who are trained in tracheostomy care and management.
- Key principles include a focus on avoidance of unnecessary interventions (especially those that generate aerosols), early recognition of deterioration, and timely response to emergencies.
- Avoid humidified wet circuits to reduce the risk of contamination if the circuit becomes disconnected.
- Avoid changing the tracheostomy tube until the patient is no longer shedding the virus.
- Leave the cuff inflated and check for leaks.
- Do not disconnect the circuit.
- Perform only closed-line suctioning.

References

- Airway and Swallowing Committee of the American Academy of Otolaryngology-Head and Neck Surgery Tracheotomy Recommendations During the COVID-19 Pandemic; taken from https://www.entnet.org/content/tracheotomy-recommendations-during-covid-19-pandemic
- Surgical Considerations for Tracheostomy During the COVID-19 Pandemic Lessons Learned From the Severe Acute Respiratory Syndrome Outbreak https://jamanetwork.com/journals/jamaotolaryngology/fullarticle/2764033
- Tracheostomy in the COVID-19 era: global and multidisciplinary guidance
  - McGrath, Brendan A et al., 2020. The Lancet Respiratory Medicine, Volume 8, Issue 7, 717 - 725