

NTSP considerations for tracheostomy in the COVID-19 outbreak

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Tracheostomy is performed in around 10-13% of all level 3 ICU admissions in the UK. The clinical course of COVID-19 in the critically ill has not yet been fully characterized but there are considerations for patients with new or existing tracheostomies, considered below. This short article considers balancing the risks of infection control risks of aerosol spread of the virus versus the best management for the patient with a tracheostomy.

This guide considers balancing the risks of infection control re aerosol spread of the virus versus the best management for the patient with a tracheostomy. This guidance is written for UK hospitals but is applicable elsewhere. You may adapt/adopt these guidelines without permission. The guidance may change as data on tracheostomy in the COVID-19 becomes available.

Who gets a tracheostomy?

Indications from European ICUs suggest that decision making around access to critical care and organ support is based largely on current practice; the expectation is that this stands for decisions to undertake tracheostomy. The major indication will remain to wean from ventilation when a primary extubation is not possible or has failed.

Currently, in-hospital mortality is around 20% for ICU patient requiring tracheostomy. A tracheostomy may not be in a patients' best interests if the prospects of long-term independent survival are limited. The mortality of ventilated patients with COVID pneumonitis appears to be around 50%. However, outcomes are heavily influenced by admission criteria and the country/healthcare system reporting these data. These decisions may become more focused in a resource-limited, overwhelmed system.

Tracheostomy may have some positive benefits in the COVID-19 pandemic, which may lead to earlier consideration than in normal practice:

- Tracheostomy offers a 'sealed' system for ongoing respiratory support which may be preferable to a primary extubation with a high chance of failure and/or the requirement for NIV/High Flow Oxygen therapy.
- Patients with tracheostomy are typically managed with reduced or no sedation. This may allow for:
 - Less intensive nursing care (the patient may be able to assist in moving, rolling).
 - Fewer pumps (advantageous if there is a shortage of drugs or devices).
 - Care may be overseen by non-ICU staff (who aren't as experienced in managing sedation perhaps).
 - However, a more awake patient can be more difficult to manage, and staff must be able to safely care for tracheostomised patients. (There may be a role for ORL/ENT/MaxFax staff here).

Timing of tracheostomy in COVID-19

There is no consistent guidance to help clinical staff plan the most appropriate time to perform a tracheostomy in the critically ill. Outside of the COVID pandemic, there are some groups who would clearly benefit from an early tracheostomy. There is evidence that some neurosurgical patients or some with short/medium-term neurological conditions can reduce ICU and hospital length of stay with an early tracheostomy. Patients who need medium-term respiratory support also benefit, but this group is difficult to characterise early in their ICU stay.

The data available from international colleagues and from the literature available suggests that the acute lung injury phase of those patients with COVID-19 pneumonitis lasts around 10-14 days. For those patients who are invasively ventilated, those who tolerate critical illness and the necessary support, can anticipate an ICU stay of at least 10-14 days, probably longer in many. These estimates may change as the pandemic unfolds, but the clinical experience in Europe supports these observations from other countries.

Our understanding of what constitutes a 'COVID-positive' or an 'infective' case is also evolving. Testing is based on identification of viral RNA by PCR. The reliability of these tests is variable, with tracheal aspirates preferable to mucosal swabs. PCR positivity might not equate to infectiousness. Some evidence shows that samples with viral load <5 log copies per ml do not yield live virus (ie a 'positive test' does not always mean 'infectious'). A patient who has mounted an appropriate immune response is not likely to be infectious, although the criteria to judge this and the associated antibody tests are currently being refined.

It is likely that the viral load will be low in patients by 3 weeks after the development of symptoms. Most centres are considering that two negative COVID viral PCR tests mean that the patient can be considered non-infectious. Virus has been detected for prolonged periods in the critically ill, however.

There may be an appropriate clinical requirement to undertake tracheostomy before the patient is considered negative/non-infectious. For example, patients predicted to fail a primary extubation or those with an airway problem.

The clinically appropriate window for performing tracheostomy is likely to fall within the overlapping window whereby the patient becomes non-infectious. Given that tracheostomy is a high-risk procedure for generating aerosols, **in order to protect staff that are involved in tracheostomy procedures, we recommend that clinicians consider that any critically ill patient recovering from COVID-19 pneumonitis is considered high risk of infection to staff during tracheostomy insertion.**

This has implications for the location and conduct of the procedure, considered below.

In summary:

- **Delay tracheostomy if possible until the patient is considered COVID-negative / non-infective.**
- **Timing of tracheostomy must balance the risks of prolonged trans-laryngeal intubation for the patient with the risks to the clinical staff involved in the procedure.**
- **Consider all critically ill patients recovering from COVID-19 pneumonitis as high risk.**

Practical management of the ventilated tracheostomy patient with COVID-19

- Positive pressure support/ventilation increases the potential aerosol risks to staff
- PPE as per local/national guidelines.
- A cuff inflated, closed system is the most likely to prevent cross-contamination of staff, equipment, other patients.
- Closed suction should be mandatory.
- Consider reducing the frequency of cleaning/inspecting the inner cannulae, or whether this should be used at all. (Risk assess daily). Thick secretions or any time spent on an open system should be indications to use an inner cannula.
- Cuff deflation as part of weaning, will increase aerosol generation and so the patient should either be in a side room or in a cohort area with other COVID-19 patients. Staff will need to wear PPE, especially if the patient is still managed with a ventilator or a system providing CPAP.
- It may be possible to group weaning tracheostomised patients together which may facilitate cuff deflation strategies. Successful and prompt weaning requires experienced multidisciplinary staff, who would all need to wear appropriate PPE in this environment.
- Hospitalised patients who are normally managed with an un-cuffed tracheostomy (typically the long-term ventilated in the community) will require a trachy change to a cuffed tube and ventilation with a closed system in a critical care environment. This will remove the ability to vocalise (if present). If a cohort area exists where cuff deflation or CPAP is occurring, then this is an option,

Practical management of the non-ventilated tracheostomy patient with COVID-19

- PPE as per local/national guidelines
- These patients will need an 'open' humidification system (ranging from a Buchanan bib or similar simple HME device) through to active warmed humidification.
- Supplemental oxygen may be required, delivered by a trache-mask (offers some protection to the immediate environmental droplet spread).
- These patients should be considered in the same category as any other COVID-19 patient who requires hospitalization and/or oxygen therapy.
- They will need managing by specialist staff, trained to manage patients with tracheostomy. They will need high-risk (to staff) airway interventions such as suctioning and inner cannula care.
- A simple face mask may be applied over the face if the cuff is deflated to minimize droplet spread from the patient.

Where to manage a patient with a tracheostomy?

There are likely to be competing priorities when considering at hospital/strategic level where best to manage patients with a tracheostomy in hospitals during the pandemic. It is likely that a significant rise in the in-hospital population of tracheostomised patients will occur.

- Patients may be COVID-19 +ve, suspected +ve, or -ve.
- Patients may need invasive ventilation.
- Patients need to be managed by staff who are trained in tracheostomy care to:
 - Prevent problems through *basic care, done well*.
 - Detect *red flags* and warning signs early through education.
 - Know how to troubleshoot problems and manage emergencies through education and rehearsal.



We recommend that at least one member of staff is appropriately trained to safely manage tracheostomy problems in each cohort location that tracheostomy patients are managed in. This standard should apply around the clock. Refresher resources are available from the links below.

Patients managed with a ‘closed system’ (cuff up and HME/ventilator) can be managed in COVID-positive cohort locations alongside similar patients (typically an ICU) with appropriate precautions.

Patients managed with cuff deflation and pressure support/ventilation should be considered as high risk to staff due to aerosol spread. Patients should be managed in a contained cohort area (see table below) recognising that the majority of hospitals have limited access to these facilities.

Tier of Recommendation	Recommended Location
1	Negative pressure single occupancy room with antechamber
2	Negative pressure single occupancy room without antechamber
3	Standard single occupancy room with HEPA / virus filter
4	Negative pressure (closed door) cohort area/bay
5	Negative pressure (closed door) cohort area/bay with HEPA / virus filter
6	Closed door cohort area

Patients managed with cuff deflation without ventilation should be managed in cohort areas depending on their COVID status. Airway interventions and practical tracheostomy management are still considered high risk to staff as aerosols can be generated by coughing associated with tracheostomy care. COVID negative patients that are considered non-infective can be managed using standard precautions.

Emergency management

- Emergency care should continue as per the NTSP guidelines.
- Airway interventions should be planned where possible to allow appropriate PPE to be applied.
- It is likely that a member of staff in a cohort area will be wearing at least some appropriate PPE at the time of an airway emergency – call for help.
- PPE should be immediately available in areas that COVID-19 positive tracheostomy patients are managed in.
- Staff should ensure that they protect themselves in order to best care for our patients.

Performing a new tracheostomy

The likelihood is that the majority of elective ICU tracheostomies in the coming months will be for COVID-19 related respiratory failure and to facilitate weaning from mechanical ventilation.

ORL/ENT/MaxFax surgical teams may be available to help with procedures (less elective work) and should be used. Nursing staff from these areas may be invaluable if there is a sharp increase in the ICU population with tracheostomy.

- [See ENT-UK or relevant surgical guidelines](#)
- Local Safety Standards for Invasive Procedures (LocSSIPs) MUST be used
- Plan, rehearse, check and stay safe
- Pre-procedural discussions and detailed planning are essential before donning PPE and collecting the patient

Location

Tracheostomy procedures may be performed in the ICU or in new, unfamiliar environments, depending on where the patient is being managed and the prevailing infection control measures. If new teams or locations are being used– ensure that the appropriate equipment, staff and support are available, including lighting and the ability to position the patient.

For surgeons; note ICU beds are often much wider than a theatre table, with no isolated head support. This limits surgical access. Consider bringing the patient to the side of the bed nearer the primary surgeon, although this limits the access for an assistant.

If it looks difficult (especially an obese patient) then consider moving to the OR rather than a sub-optimal location and accepting whatever infection control measures this entails.

Moving a critically ill patient to the OR carries its own risks which must be balanced on an individual basis by the teams involved the procedure.

If you are going to perform the procedure on the ICU, plan to undertake it in the same location that you would electively intubate a COVID-positive patient in, with appropriate PPE.

Practical considerations for new tracheostomy

- The PPE might restrict views for the operator and the rest of the team. It also makes communication more difficult. Minimize noise and discuss/rehearse beforehand.
- Agree beforehand what the team will do and discuss the case in detail before you get to the bedside.
- Check you can see what you are doing in whatever PPE you need to use.
- The procedure will inevitably generate aerosols in a ventilator-dependent patient. When the neck is punctured, dilated or opened surgically, consider reducing the ventilatory pressures and/or frequency to minimize aerosol generation if the patient condition allows. Consider suspending ventilation if possible. An experienced anaesthetist or intensivist should manage the 'top end'.
- Think about the best location for tracheostomy and think about nearby patients, staff and equipment.
- The ideal location is in a (negative pressure) side room or a theatre suite (with the problems of transfer).
- Take **minimal staff**.
- **Use the most experienced staff** (who will probably be the quickest).
- **Consider a travelling trachy team** – perform insertions and review existing patients.
- Liaise now with ORL/ENT/MaxFax surgical teams, medical and nursing colleagues.

Percutaneous or surgical tracheostomy?

It is possible to insert a tracheostomy safely using a surgical, percutaneous or hybrid technique. We recommend that operators undertake the procedure with which they are most familiar.

Modifications to the surgical technique are described by ENT-UK and other groups. Briefly these comprise steps to minimize aerosol generation when the trachea is opened or punctured:

- Surgical ties in preference to diathermy may reduce vapour plumes
- Advance the tracheal tube beyond the surgical window to protect the cuff
- It may be possible to use the ICU ventilator for transfer, theatre and afterwards (minimizing circuit changes)
 - Check before the procedure
 - Only use equipment that operators are familiar with
- Pre-oxygenate; then cease ventilation and open circuit valves prior to opening the trachea
- *Consider* clamping tracheal tube (subglottic suction tubes can be damaged and manipulating the tube may displace it)
- Prepare the breathing circuit
- Resume ventilation when a cuff-inflated sealed system is established

We recommend that only use **cuffed, non-fenestrated** tracheostomy tubes are used. It is important to meticulously check the position of the tube in the 30-degree 'ICU nursing' position in which the patient will spend the next few days or weeks. This should minimise the requirement for inspection or manipulation of a tracheostomy tube following the procedure.

We do not recommend that airway endoscopy is routinely undertaken. Airway endoscopy during percutaneous tracheostomy is recommended and is widely considered to improve the safety of the procedure. It is likely that aerosol generation can be better controlled with an open surgical or hybrid procedure, although this depends on the experience of staff involved in the procedure.

It is likely that the knowledge base around tracheostomy insertion in COVID-positive patients will evolve and we aim to learn together what the best practices are for the safety of staff and for our patients.

Existing patients with tracheostomies

Current in-patients

- In-patients are at an unknown risk of COVID-19 from visitors and staff
 - Plan where a patient would go if they developed symptoms.
 - What if they had an altered airway, or tracheostomy and need specialist care?
 - Plan ahead.

Current out-patients

- If a patient with a tracheostomy needs ventilator support, then they will need a cuffed tracheostomy inserting and management in a critical care location.
- A suspected or confirmed COVID-19 patient who does not need ventilatory support will need managing in a cohort area. These locations will need staff who are trained and competent to manage tracheostomies and their potential complications.
- During the peak of the pandemic, there is a high probability that patients from the community who develop respiratory symptoms are COVID positive. Patients should be treated as positive until proven negative.

Existing patients with laryngectomies

Patients who have neck-only-breathing laryngectomees don't have the nasal 'filters' and intuitively they are at greater risk of viral infection.

These patients should be contacted and offer advice. See <http://dribrook.blogspot.com/>
Some sensible, practical advice may also be relevant for hospitalised laryngectomy patients:

- Wear a stomal HME filter (not all HMEs perform equally).
- Hands-free valves minimize touching of the stoma.
- Ask the patient to manage as much of their stoma care as possible.

All multidisciplinary staff involved in tracheostomy care are advised to be familiar with the safety resources and best practices for quality improvement available at:

- www.globaltrach.org
- www.tracheostomy.org.uk
- New e-learning tracheostomy modules at e-learning for Healthcare <https://portal.e-lfh.org.uk>
- Data collection and adoption best practices are strongly encouraged