



# TRACHEOSTOMY REVIEW AND MANAGEMENT SERVICE (TRAMS) CLINICAL PROCEDURE

## HUMIDIFICATION OF INSPIRED GASES IN PATIENTS WITH TRACHEOSTOMY

### Staff this document applies to:

Nurses, Physiotherapists, Medical Staff and Speech Pathologists involved in the care of patients with a tracheostomy on all campuses; including ICU, outpatient clinics, the Ambulatory Care Centre (ACC), and the community.

### Related Austin Health policies, procedures or guidelines:

- [Optiflow Tracheostomy Direct Connector Flow Chart](#)
- [Tracheostomy Emergency Management Poster](#)
- [Tracheostomy Procedure – Suctioning via the Tracheostomy Tube](#)
- [Tracheostomy Procedure – Heat Moisture Exchangers](#)
- [Tracheostomy Procedure – Recognising & Clearing a Blocked Tracheostomy Tube](#)
- [Oxygen Therapy Manual](#)
- [Operation manual for AIRVO2](#)
- Tracheostomy e-learning Package – Humidification: Access via ATLAS

### Purpose:

To describe the rationale for providing humidification to patients with tracheostomy and the different methods used for inpatients and patients in the community.

### Key points:

- Inadequate humidification can lead to sputum plugging and partial or complete occlusion of the patient's airway. Appropriate humidification is essential in order to keep the tracheostomy tube patent.
- A completely blocked tracheostomy tube is a medical emergency. Call a Respond Blue.  
See: [Tracheostomy Emergency Management Poster](#)
- A partially blocked tracheostomy tube may quickly progress to a completely blocked tube. Be alert for signs of partial blockage (e.g.: difficulty passing a suction catheter, a “whistling” noise or inspiratory stridor when the patient breathes, patient vocalising without a Passy Muir Valve in place).
- The Optiflow delivery systems require a 30L/min medical air flow meter to provide adequate flow and humidification to patients with a tracheostomy.  
See: [Optiflow Direct Tracheostomy Connector Flow Chart](#)

### Rationale:

During normal breathing, the body heats and humidifies air as it passes through the mouth and nose to the trachea. When a patient is breathing via a tracheostomy tube, these natural mechanisms are bypassed; therefore artificial means of heating and humidifying air must be employed.

All patients with a tracheostomy tube must have their humidification needs assessed and monitored by a physiotherapist and/or nursing staff to ensure:

- The air or oxygen supplied to the airways of a patient with a tracheostomy tube is heated and humidified appropriately.
- The tracheostomy tube is free from accumulated dried secretions and sputum clearance is enhanced by a well humidified airway.

Signs that a patient is not adequately humidified include:

- An irritable cough.
- Thick or tenacious secretions.
- Difficulty expectorating secretions.
- An absence of secretions in a normally productive patient.
- Resistance felt on suctioning.
- Secretions slow to move up the catheter during suctioning.
- Secretions collecting on the outside of the catheter during suctioning.
- Secretions visibly collecting within the tracheostomy tube.

## Equipment:

### For acute inpatient

- A MR850 humidifier that delivers to a guaranteed 37°C.
- Disposable corrugated tubing and chamber kit with internal heating wire (RT308)
- Bag of **water** specific for use with heated humidification systems
- A patient who is an existing TRAMS community patient or is being set up for discharge to the community with a tracheostomy may use an Airvo2 humidifier if set up by TRAMS
- For short term use, [heat moisture exchangers \(HME\)](#) may also be considered if deemed appropriate by physiotherapists or senior nursing staff.

### For non-ventilated patients in the community

- A humidifier that delivers to 37°C e.g. Airvo2™
- F&P 900PT560 disposable tubing
- HC360 reusable chamber
- Patients will also be provided with [heat moisture exchangers \(HME\)](#)

### For ventilated patients in the community

- Individualised requirements are assessed by the Victorian Respiratory Support Service (VRSS) Outreach nurses or physiotherapist.
- Equipment may include a humidifier that delivers between 33-37°C with reusable tubing and water chambers, or [heat moisture exchangers \(HME\)](#).

See also [TRAMS Hub site](#) for pictures of humidification equipment commonly used.

## Procedure:

### For acute patients

- Obtain an MR850 humidifier from Central Sterile Supply Department (CSSD) or ward supplies (exceptions to the delivery of 37°C may exist within the VRSS).
- Set up the RT308 disposable kit. Attach temperature probe and heating wires to tubing. Fill Connecting the bag of water for humidification to the chamber. Connect a tracheostomy mask, direct connector or flex tubing to the distal end of the corrugated tubing ensuring the correct set up is used. See [Oxygen Therapy Manual](#) and [Optiflow Direct Tracheostomy Connector Flow Chart](#)
- Check that the humidifier is set to Endotracheal Tube (ETT) or tracheostomy mode to ensure that the humidifier will deliver 37°C.
- Ensure that the desired oxygen concentration is being delivered via the system in use (e.g. venturi system, dual flow adaptor, high flow system or ventilator).  
See [Oxygen Therapy Manual](#) and [Optiflow Direct Tracheostomy Connector Flow Chart](#)
- Change the disposable circuit weekly, or more frequently if visibly soiled

### For non-ventilated patients in the community

- An Airvo2™ (humidifier that delivers to 37°C) is provided by TRAMS.  
See [Operation manual for AIRVO2](#)
- Fill the chamber with distilled water and attach to the unit. Connect the disposable circuit to the Airvo2™.
- Connect a direct connector to the distal end of the corrugated tubing
- Change the disposable circuit as instructed by TRAMS or more frequently if visibly soiled
- Note: The Airvo2™ is pre-set by TRAMS with the desired flow and temperature settings.

### For ventilated patients in the community

- Ventilated patients in the community will have their humidification needs assessed by a senior physiotherapist, VRSS Outreach nurse or member of medical staff. The appropriate humidification device should be obtained from the VRSS, and set up to individual specifications, including oxygen therapy as required.
- Clean the reusable circuitry components as directed by the VRSS

## Post Procedure:

- Ensure that the patient is breathing comfortably and SpO<sub>2</sub> is stable.
- Ensure that the patient is being adequately humidified and tracheostomy tube is patent.
- Document any changes or concerns about humidification in the patient's history.

## Use of nebulisers with tracheostomy:

- Routine or PRN use of normal saline nebulisers are not required. For acute inpatients with tracheostomy, nebulisers should not be used routinely however may be used in an emergency or after approval by medical staff. For patients living in the community, nebuliser recommendations will be tailored to the individual.
- If inhaled medications are required, these should be administered via meter dose inhalers (MDI):
  - For spontaneously breathing patients: using a spacer. The Bird Healthcare e-Chamber spacer is available from pharmacy and fits directly to the tracheostomy hub
  - For invasively ventilated patients: using a MDI connector, such as the Teleflex Medical Hudson RCI MDI Adaptor (REF 1659) or Intersurgical connector 22M-22F with MDI insert (REF 1964001) or comparable products.
- Nebuliser delivery is an aerosol generating procedure which increases the risk of transmission of droplet borne pathogens.
- Nebulisers should not be used in patients who are placed in droplet or airborne precautions/isolation, unless discussed with Respiratory Unit medical staff. If nebulisers are deemed necessary, staff should refer to the appropriate guidelines for use of PPE.
- In some patients who have significantly thick secretions despite optimal humidification, additional nebulisers may be prescribed (e.g. 0.9% sodium chloride, bronchodilators or a mucolytic). This should always be discussed with the treating unit medical staff and physiotherapist. Ongoing requirements should be reviewed on a regular basis. Particular caution should be taken for patients who are placed in droplet/airborne isolation as mentioned above.
- If nebulisers are deemed to be necessary after discussion with medical staff, they can be placed within the oxygen delivery + humidification system as shown:

Set up for nebuliser in use with tracheostomy shield and venturi



Set up for nebuliser in use with Optiflow direct connector and dual flow adaptor



### Note:

- For patients who do not require supplemental oxygen and are being humidified on FiO<sub>2</sub> 21%, the nebuliser chamber can be attached directly to a tracheostomy shield.
- If a patient is receiving oxygen therapy using a dual flow adaptor with Optiflow direct connector, an additional medical air flow meter needs to be available to drive the nebuliser. This can be achieved if there is a double adaptor for a single air outlet or if there are dual airflow outlets at the bedside.



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## Legislation/References/Supporting Documents:

Galluccio, S.T. & Bersten, A.D. 2014. Humidification and inhalation therapy. In Bersten & Soni (Eds.), *Oh's Intensive Care Manual*, 7<sup>th</sup> Edition (pp375-381). Elsevier

Gomaa, D. & Branson, R.D. (2019). Conditioning Inspired Gases for Tracheostomy. *Respiratory Care*, 64 (2), 233-234

Kelly M, Gillies D, Todd DA, Lockwood C. 2010 Heated humidification versus heat and moisture exchangers for ventilated adults and children. *Cochrane Database of Systematic Reviews*, Issue 4. Art. No.: CD004711. DOI: 10.1002/14651858.CD004711.pub2.

Mitchell R B 2013 Clinical Consensus Statement: Tracheostomy Care on behalf of American Academy of Otolaryngology - Head and Neck Surgery *Otolaryngol Head Neck Surg* vol. January 2013 148 no. 1 6-20

Morris, L & Sherif Afifi, M. *Tracheostomies*. 2010 The Complete Guide. Springer Publishing Company.

Nakanishi, N., Oto, J., Itagaki, T., Nakataki, E., Onodera, M., & Nishimura, M. (2019). Humidification performance of passive and active humidification devices within a spontaneously breathing tracheostomized cohort. *Respiratory care*, 64(2), 130-135.

Nishimura, M. (2016) High-flow nasal cannula oxygen therapy in adults: physiological benefits, indications, clinical benefits and adverse effects. *Respiratory Care*, 61 (4), 529-541.

Wong, Shakir, C.Y.Y, Farboud, A.A, Whittet, H. B. (2016). Active versus passive humidification for self-ventilating tracheostomy and laryngectomy patients: a systematic review of the literature. *Clinical Otolaryngology*.

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