

TRACHEOSTOMY - ADMINISTERING NEBULISED HYPERTONIC SALINE PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- It is important that the **correct nebuliser system** with an **expiratory valve** is used when administering nebulised hypertonic saline. Refer to pictures of nebuliser set ups in [section 4](#).
- **Administration of Nebulised hypertonic saline at home** – Home care guidelines must be closely followed to ensure there is an expiratory valve incorporated into the nebuliser system that is being used.
- If a patient you are caring for has been prescribed nebulised hypertonic saline you should **contact the relevant CNC** for further advice.
- Three wards (**Hunter Baillie, Variety & Wade**) at CHW have special alert in regard to potential inadvertent activation of fire alarms during administration of the drug. [Refer to Local Work Practice](#).

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st March 2024	Review Period: 3 years
Team Leader:	Clinical Nurse Consultant	Area/Dept: Sleep Medicine

CHANGE SUMMARY

- 19/02/24: Minor review – updated images and labelling of device setups.
- 22/02/24: Minor review – added hyperlink to How to use Hypertonic Saline at home Infosheet.

READ ACKNOWLEDGEMENT

- All Nursing staff and Physiotherapists caring for patients receiving nebulised hypertonic saline via tracheostomy while in hospital should read and acknowledge this document.

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1 Why Do We Nebulise Hypertonic Saline?

- Hypertonic Saline is a sodium chloride solution with a concentration of sodium chloride higher than that found in physiological saline (0.9%), typically 3% and 6%. Nebulised hypertonic saline is a very effective way of improving lung clearance and thinning secretions. The benefit of nebulising hypertonic saline is that medication can be delivered directly to the airways (1,2).
- Hypertonic Saline has been proven to be safely administered in paediatric cohorts (3-5) and in patients with a tracheostomy (6-8)
- It is important that the nebuliser used is able to produce a small enough particle size to ensure a good deposition of the medication reaches the lungs. See [section 4](#) for equipment and detail/photos.
- A potential side effect of nebulised medications is bronchospasm, and may warrant pre-medication with short acting bronchodilating agents (e.g. salbutamol) especially if the patient has known or suspected bronchial hyperresponsiveness (9).

2 General Principles

- All doses of hypertonic saline, including the test dose should be prescribed on the patients' medication administration record either in eMM or on the national inpatients medication chart.
- When using a nebuliser for the first time, explain the procedure to the child and parent/carer.
- Fresh solutions should be prepared for each inhalation treatment and any solution remaining in the nebuliser bowl should be discarded.
- *One way valves must always be used* when administering nebulised hypertonic saline in hospital. (Refer to [section 4.](#))
- The minimum amount of solution for effective use of the nebuliser is 2 mL to a maximum of 5 – 8 mL: check the nebuliser product guide.
- Air should be used when administering nebulised hypertonic saline, unless oxygen is specifically ordered. The flow should be 4-6 L/min
- Nebuliser equipment should be washed after every use –including the one-way exhalation valve. Wash equipment in warm soapy water, rinse well and place parts on a piece of dry, clean paper towel to dry. Nebuliser equipment should not be reassembled until all parts are completely dry. NB: the nebuliser tubing should not be washed.

2.1 First Dose of a Nebulised Hypertonic Saline

Due to the risk of bronchospasm, the first dose (or test dose) of a nebulised hypertonic saline should be given in a supervised environment (e.g. on the ward, or in the respiratory function laboratory). Monitoring to detect significant bronchospasm should ideally include:

- The child's chest should also be auscultated for wheeze before and after the test dose with monitoring of oxygen saturations during the test dose.
- The patient is deemed to have failed the test dose if there is:
 - Development of audible wheeze on auscultation
 - Significant decrease in oxygen saturations to below 94%, or a $\geq 3\%$ decrease below the pre-test baseline level if the baseline oxygen saturation lies below 94%.
- In the event that the test dose is not tolerated, administer salbutamol as per order in eMR (typically salbutamol 100 microgram MDI inhaler 4-6 puffs via spacer)
 - If wheeze resolves an/or oxygen saturations return to baseline within 15 minutes, salbutamol pre-treatment for future doses of nebulised hypertonic saline should be given (typically salbutamol 100 microgram MDI inhaler 4-6 puffs via spacer 10 minutes prior to dose).
 - If the patient's oxygen saturations do not return to normal within 15 minutes, or wheeze persists, continuing treatment with the nebulised hypertonic saline should be discussed with the treating team.
- If an outpatient is to be started on a nebulised hypertonic saline and cannot be supervised during their first dose, salbutamol pre-treatment 10 minutes prior (typically salbutamol 100microgram MDI inhaler 4-6 puffs via spacer) to each dose of the nebulised hypertonic saline will be prescribed until a dose can be given supervised using the protocol above.
- Treatment with nebulised hypertonic saline should be stopped if the patient displays any paroxysmal coughing, shortness of breath or audible wheeze and the parent should seek local medical review and contact their CNC to discuss ongoing treatment.

3 Procedure

Note: The general principles around nebulising hypertonic saline are the same whether a patient is using a tracheostomy only or closed circuit ventilation, however the setup is different for each – Refer to [section 4](#) for pictures of nebuliser set ups.

Equipment

- Nebuliser: (with tubing), Liquorice stick (Catheter Mount), One way valve (see pictures in [section 4](#)). Equipment is available from your respective hospitals as per section 4
- Prescribed hypertonic saline
- 3 or 5 mL syringe and a drawing up needle (if needed)
- Water for injection (if needed)
- Gloves and goggles

3.1 Procedure

1. Health care provider should perform hand hygiene and don appropriate PPE.
2. Prepare patient by explaining procedure to both child and parent, role of medication and any potential side effects.
3. Open top of nebuliser and ensure the nebuliser is empty and clean
4. Prepare medication. "The dose of hypertonic saline should be 4 mL of either a 3% or 6% sodium chloride solution ⁽¹⁰⁾

[How to use Hypertonic Saline at home Infosheet](#)

If the prescribed dose is 4 mL of 6% nebulising solution (HyperSal6 or Mucoclear 6%), which is available in a 10 mL plastic sachet, then procedure would be as follows:

- Carefully tear off the top of the sachet, using a syringe and a blunt needle then draw up 4 mL of the HyperSal6, remove needle and place medication into the nebuliser.

If the prescribed dose is 4 mL of 3% nebulising solution, this can be prepared in 2 ways; (Dependent on whether 3% nebulising solution is available (Mucoclear 3%)).

1. Mucoclear 3% is available in a 4 mL plastic ampoule:
 - Twist off top of ampoule, squeeze entire contents into nebuliser as the entire ampoule is required (4 mL).
2. HyperSal6 sachet:
 - Using a blunt needle, draw up 2 mL of the HyperSal6 solution from the sachet then 2mL of sterile water for injection. Inject the resulting 4 mL of 3% solution into the nebuliser.

NB: To allow effective operation of the nebuliser the total amount of the fluid in the nebuliser should be at least 2 mL, but not more than 5 – 8 mL (check the nebuliser product guide). Use 4 mL of your prescribed hypertonic saline concentration for each dose.

5. Close the cap/top on the nebuliser, (as pictured in [section 4](#)).
6. Connect the tubing to the nebuliser and wall air outlet, place the liquorice stick onto the tracheostomy, and turn on air flow to between 4 – 6 L/min.
7. Run the nebuliser for 10 minutes or until there is no longer mist being produced. Run time is dependent upon air flow being used
8. Turn off wall air outlet, remove nebuliser from child and clean equipment. Nebuliser, liquorice stick and one-way valve should be rinsed out after every use, wash in warm




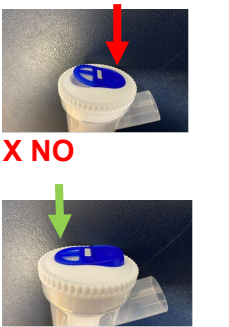
soapy water and place parts on a piece of dry, clean paper towel to dry (do not put nebuliser back together until completely dry).

For tracheostomy patients, without ventilator support, disconnect humidifier / Heat and Moisture Exchanger (HME) / Swedish nose if appropriate and connect nebuliser to tracheostomy tube. When the nebuliser has stopped producing mist reconnect the Swedish nose / humidifier to tracheostomy.

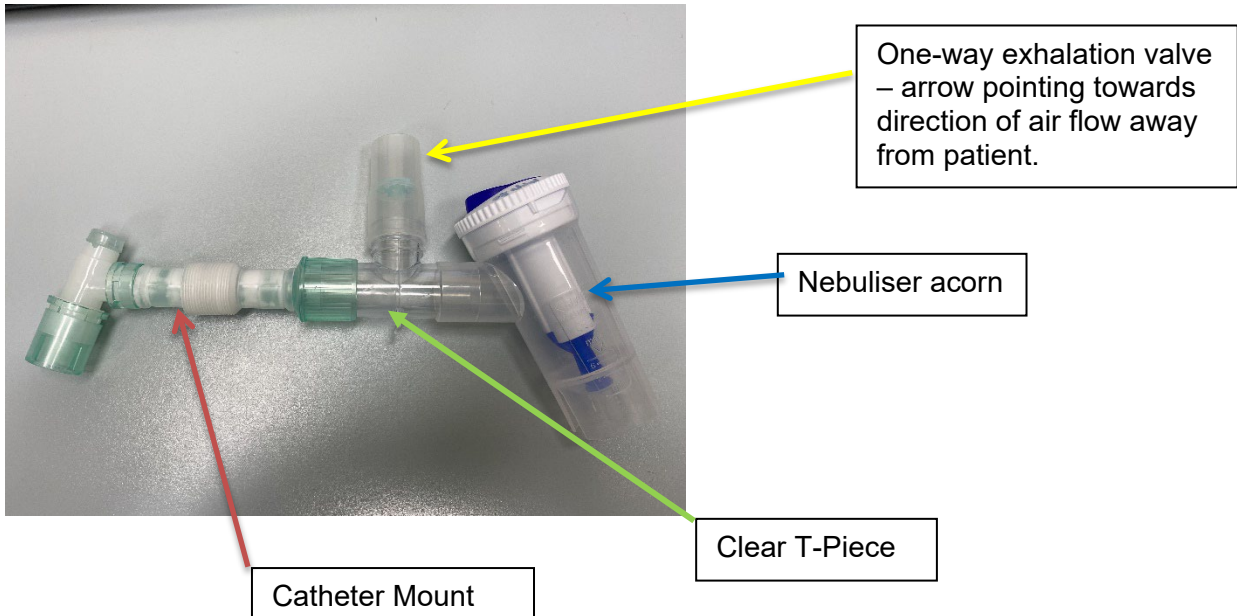
NB: The nebuliser, T-connection (see pictures in [section 4](#)), should be returned to inhalation therapy once the patient no longer needs it, some parts can be disinfected and reused.

4 Nebuliser Set-Up (using the Flaem RF7 nebuliser)

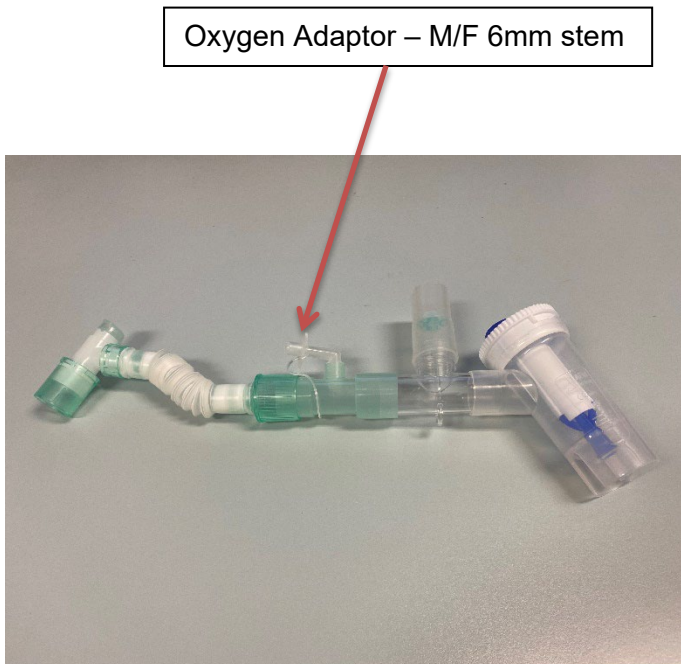
4.1 Assembly of the RF7 Nebuliser

			
<p>Twist lid anti-clockwise to open and instil nebuliser medication</p>	<p>Place blue part of inner compartment over clear spike of outer component</p>	<p>Twist lid clockwise to lock into place</p>	<p>The “dual speed” selector on top of the lid should be pressed so the valve system (opposite the MAX marking) is down. This will optimise medication delivery to the lower respiratory tract and limit environmental dispersion of the medication</p>

4.2 Patients with Tracheostomy (not requiring ventilator assistance)



If oxygen is required to be given at the same time as the nebulised medication, the oxygen adaptor must be placed in the circuit between the T-Piece and the patient as demonstrated below.



4.3 Patients on closed circuit ventilation



Exhalation Valve for this set up MUST be insitu at the end of the ventilator circuit – NOTE – salt crystals can block this exhalation valve so inspection of the valve is ESSENTIAL prior to and post administration of hypertonic saline dose

22 m/f connector required for this set up.

For **assistance with setting up a patient who is ventilated** - discuss with the Sleep medicine/LTV CNC, Physiotherapist or the PICU nurse practitioners if the patient is in PICU.

- All nebuliser equipment pictured is available from Inhalation Therapy
- The nebuliser, Y-connector, mouth piece and masks should be returned to Inhalation Therapy following use (once patient is discharged or treatment ceased). Refer to *Giving Nebulised hypertonic saline at Home* (Homecare Guideline in development).
- For patients who are admitted regularly for administration of nebulised hypertonic saline they should be encouraged to bring their nebuliser equipment with them for continued use in hospital. The Pari LC sprint nebuliser should be replaced after one year's use. New nebulisers can be purchased by families for home use from the Appliance Centre.
- Refer to the 'instructions for use' leaflet for full use and recommendations when using the nebuliser.

Note: All parts pictured above are available from:

CHW - Inhalation Therapy

SCH - Nebuliser bowls and T-Pieces can be obtained from the physiotherapy team. Catheter Mount / Liquorice sticks and one way valves can be obtained from the Complex Airway CNC

5 Administration of medication at home

If the patient takes the nebuliser home for continued use, ensure they are sent home with all attachments including a one-way expiratory valve (Home Care guideline in development).

6 References

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