

# ADMINISTERING NEBULISED ANTIBIOTICS - CHW PRACTICE GUIDELINE®

## DOCUMENT SUMMARY/KEY POINTS

- It is important that the **correct nebuliser system** is used when administering nebulised antibiotics. Refer to the pictures at the end of this document.
- All nebulisers used in hospital for antibiotics **must have a filter attached**.
- You must ensure your nebuliser set up has an **expiratory outlet** (see pictures of nebuliser set ups in [section 4](#)).
- **Nebulised antibiotics at home** do not need a filter but the CHW Homecare Guidelines must be closely followed to ensure there is an expiratory valve incorporated into the nebuliser system that is being used.
  - Refer to **Giving Nebulised Antibiotics at Home Homecare Guideline:**  
<http://chw.schn.health.nsw.gov.au/o/documents/policies/homecare/2006-8121.pdf>
- If a patient you are caring for has been prescribed nebulised antibiotics you should **contact the relevant CNC** for further advice.

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.

<b>Approved by:</b>	SCHN Policy, Procedure & Guideline Committee	Original endorsed by HCQC
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<b>Team Leader:</b>	Cystic Fibrosis CNC	<b>Area/Dept:</b> Ambulatory & Transitional Care CF

## CHANGE SUMMARY

- N/A – new document.

## READ ACKNOWLEDGEMENT

- All Nursing staff caring for patients receiving nebulised antibiotics while in hospital should read and acknowledge this document.

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## 1 Why Do We Nebulise Antibiotics?

- Nebulised antibiotics are a very effective way of treating certain bacterial chest infections. The benefit of nebulising antibiotics is that medication can be delivered directly to the airways, which is the site of infection.
- The advantages of nebulised antibiotic therapy for respiratory tract infections has been recognised for many years. An antibiotic delivered directly to the site of infection should be most effective, providing sputum concentrations well above the minimum inhibitory concentrations (MICs) necessary to achieve a bactericidal effect. These levels cannot be reached by intravenous administration without unacceptable risks of systemic toxicity, but can be realised by inhalation of aerosolised antibiotics which, because of their minimal systemic absorption are unlikely to cause adverse effects, such as ototoxicity or nephrotoxicity with aminoglycosides.
- Nebulised antibiotics are used for the treatment of respiratory tract infections caused by bacteria (such as pseudomonas) for which there are few suitable oral antibiotics. They can be used intermittently to treat an acute infection (a course is usually one month), or as a part of a regular medication regime for patients with chronic chest infections. It is important that the nebuliser used is able to produce a small enough particle size so you get good deposition of the medication into the lungs. The nebuliser recommended for use is the Pari LC sprint nebuliser. Use of a mouthpiece can maximise lung deposition (see [section 4](#) for more details/photos).
- A potential side effect of nebulised medications include bronchospasm, and may warrant pre-medication with short acting bronchodilating agents (e.g. salbutamol). Some literature estimates the rate of bronchospasm to be as high as 30%.

## 2 General Principles

- 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.
- *Filters must always be used* when administering nebulised antibiotics in hospital. (Refer to [section 4](#) for pictures of nebuliser set up).
- The minimum amount of solution for the nebuliser to be given effectively is 2mL to a maximum of 8mL; however it would be best to keep to a maximum of 5mL as nebulisation time is increased as the volume of solution is increased.
- Air, running at 4 – 6 L/minute, should be used when administering nebulised antibiotics, unless oxygen is specifically ordered.

- A sealed face mask or mouth piece should be selected taking into consideration the age and developmental stage of the child. For children over 5 years, who are developmentally able, a mouth piece is considered the best delivery method; otherwise a facemask should be used.
- The clinical indication may also influence the choice of interface e.g. using a facemask and nasal breathing to facilitate sinus deposition of antibiotic.
- The child should rinse out their mouth following the administration of nebulised antibiotics.
- Nebuliser equipment should be washed after every use. Wash in warm soapy water, rinse well and dry carefully with clean paper towel, or place parts on a piece of dry, clean paper towel to dry. Nebuliser equipment should not be reassembled until all parts are completely dry.

## 2.1 First Dose of a Nebulised Antibiotic

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

- Spirometry performed before and after the test dose (in the respiratory function unit), with monitoring of oxygen saturations during the test dose.
- If spirometry is not possible (e.g. poor technique due to young age or cognitive impairment), then oxygen saturations should be monitored during the test dose.
- The child's chest should also be listened to for wheeze before and after the test dose.
- The patient is deemed to have failed the test dose if there is:
  - A fall in actual forced expired volume in 1 second (FEV1) from baseline of 10%.
  - Development of audible wheeze on auscultation
  - Significant decrease in oxygen saturations, defined as a  $\geq 3\%$  decrease below the pre-test baseline level.
- In the event that the test dose is not tolerated (as per guidelines above), administer salbutamol (typically 4-6 puffs x100mcg via MDI and spacer) and if the above changes normalise within the following 15 minutes (FEV1/Oxygen saturations return to baseline/wheeze resolves) then salbutamol pre-treatment for future doses of that nebulised antibiotic should be given (typically 4-6 puffs x100mcg via MDI and spacer 10 minutes prior to dose).
- If the patients FEV1/oxygen saturations do not return to normal within 15 minutes, or wheeze persists, continuing treatment with the nebulised antibiotic should be discussed with the treating team.
- If an outpatient is to be started on a nebulised antibiotic and cannot be supervised during their first dose, give salbutamol pre-treatment 10 minutes prior (typically 4-6 puffs x100mcg via MDI and spacer) to each dose of the nebulised antibiotic until a dose can be given supervised using the protocol above.

## 3 Equipment and Procedure

**Note:** The general principles around nebulising antibiotics are the same whether a patient is on Non-Invasive Ventilation (NIV), closed circuit ventilation or no assisted ventilation, however the setup is different for each – refer to [section 4](#) for pictures of nebuliser set ups.

- Nebuliser- Pari LC sprint (with tubing), mouth piece or sealed mask, filter set (see pictures in section 4. All equipment is available from CHW Inhalation Therapy.
  - NB: The original mouth piece that comes with the Pari nebuliser (with blue expiratory valve) should be replaced with a mouth piece that has no expiratory valve when a filter is being used, but it should be kept (do not throw away) as it may be needed for continued treatment at home if a filter is not used (Refer to [Giving Nebulised Antibiotics at Home](#) Homecare Guideline)
- Prescribed medication
- 3 or 5mL Syringe and needle (if needed)
- Sodium chloride or Water for injection (if needed)
- Gloves and goggles when giving via tracheostomy

### 3.1 Procedure

1. Prepare patient by explaining procedure to both child and parent, role of medication and any potential side effects.
2. Open top of nebuliser and ensure the nebuliser is empty and clean
3. Prepare medication, check you have the correct medication and check expiry date:
  - i. **If medication is in a plastic ampoule:** twist off top, if the whole ampoule is needed squeeze contents into nebuliser, if only part of the ampoule is needed, using a syringe with a needle attached, draw up the correct amount of medication and then put into nebuliser.
  - ii. **If medication is a liquid in a glass ampoule:** carefully snap off the top of the ampoule, using a syringe with a needle attached draw up the correct amount of medication and place into the nebuliser.
  - iii. **If medication is in a powder form:** Using a needle and syringe draw up correct amount of sodium chloride or water for injection, add to glass ampoule, shake till powder is completely dissolved, withdraw required amount of medication and put into nebuliser.

NB: To allow effective operation of the nebuliser the total amount of the fluid in the nebuliser should be at least 2mL, but not more than 4mL. If the medication is less than 2mL, add sodium chloride to the nebuliser to make a total minimum of (medication plus sodium chloride) 2mL.

4. Close the cap/top on the nebuliser, ensure the filter system is attached (as pictured in [section 4](#)).

NB: The filter should be changed when you start to see medication/mist coming through it – about every 2 – 4 days. If a child indicates that it is difficult to breath out this could indicate a blocked filter so change the filter.

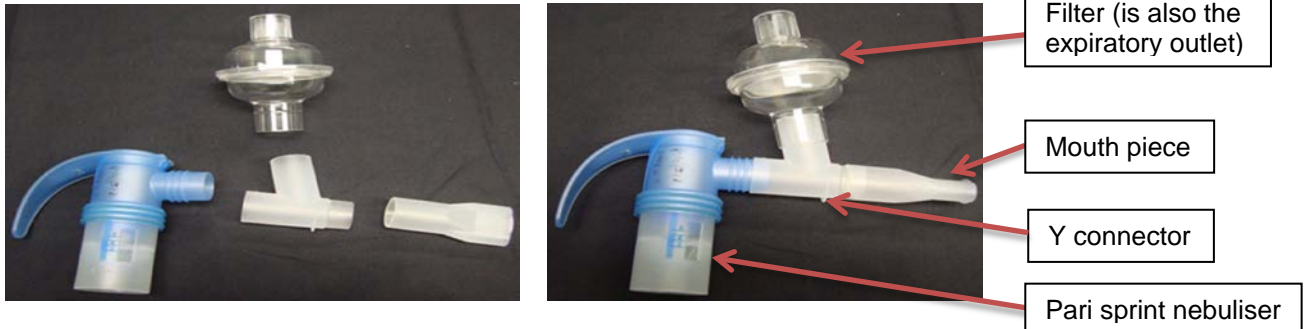
5. Connect the tubing to the nebuliser and wall air outlet, place the sealed mask on child or mouth piece in child's mouth, turn on air flow to between 4 – 6 L/min.
6. For tracheostomy patients, without ventilator support, disconnect humidifier / Swedish nose if appropriate and connect nebuliser to tracheostomy tube.
7. Run the nebuliser for 10 – 20 minutes until there is no longer mist being produced.
8. Reconnect Swedish nose / humidifier to tracheostomy
9. Turn off wall air outlet, remove nebuliser mask/mouth piece from child and clean equipment. Nebuliser and mouth piece should be rinsed out after every use, wash in warm soapy water and dry carefully with clean paper towel, or place parts on a piece of dry, clean paper towel to dry (do not put nebuliser back together until completely dry).

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

## 4 Nebuliser Set-up (using the Pari LC sprint nebuliser)

### 4.1 Patients who are self-ventilating

#### With a mouth piece

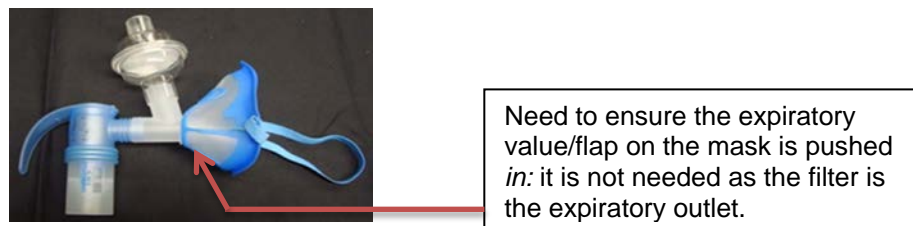


#### With a mask



Note: The filter is also your expiratory outlet.

- All parts pictured above are available from CHW Inhalation Therapy.
- The following mask can also be used; however parents need to purchase this from the CHW Appliance Centre.



### 4.2 Patients with Tracheostomy (not requiring ventilator assistance)



NB: The filter is also your expiratory outlet

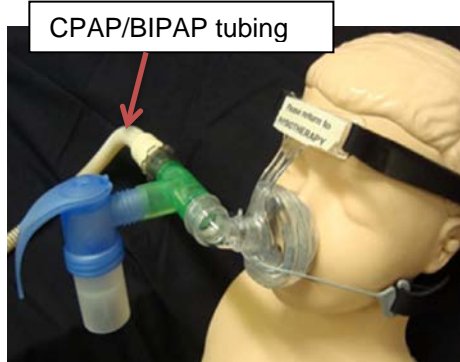
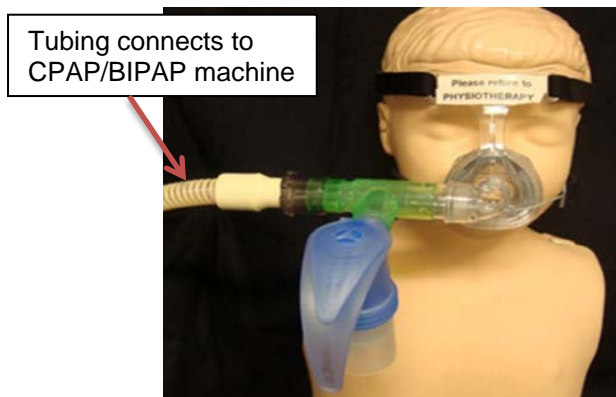
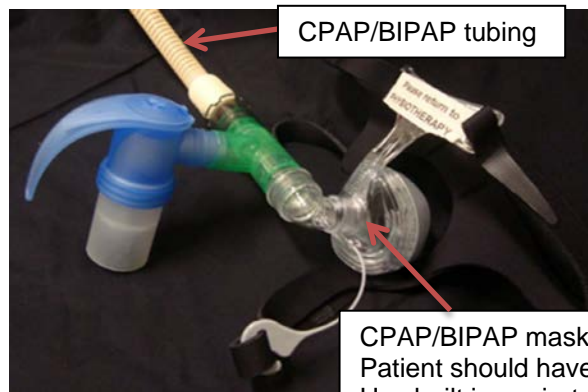
- All parts pictured above available from CHW Inhalation Therapy.



### 4.3 Patients on non-invasive ventilation (NIV) (BIPAP, CPAP)

It is not possible to filter the antibiotic from the environment in a set up with CPAP/BIPAP as the CPAP/BIPAP mask has its own built in expiratory outlets, therefore, if a patient can be removed from their CPAP/BIPAP during nebulisation of an antibiotic this should be done – but only with consultation and approval from the medical team involved. *If a patient cannot be removed from their CPAP/BIPAP during nebulisation of an antibiotic* the set should be as pictured below.

Note: the antibiotic is not being filtered from the environment so the patient should be placed in a single room or the treatment room during nebulisation to reduce exposure to other patients.

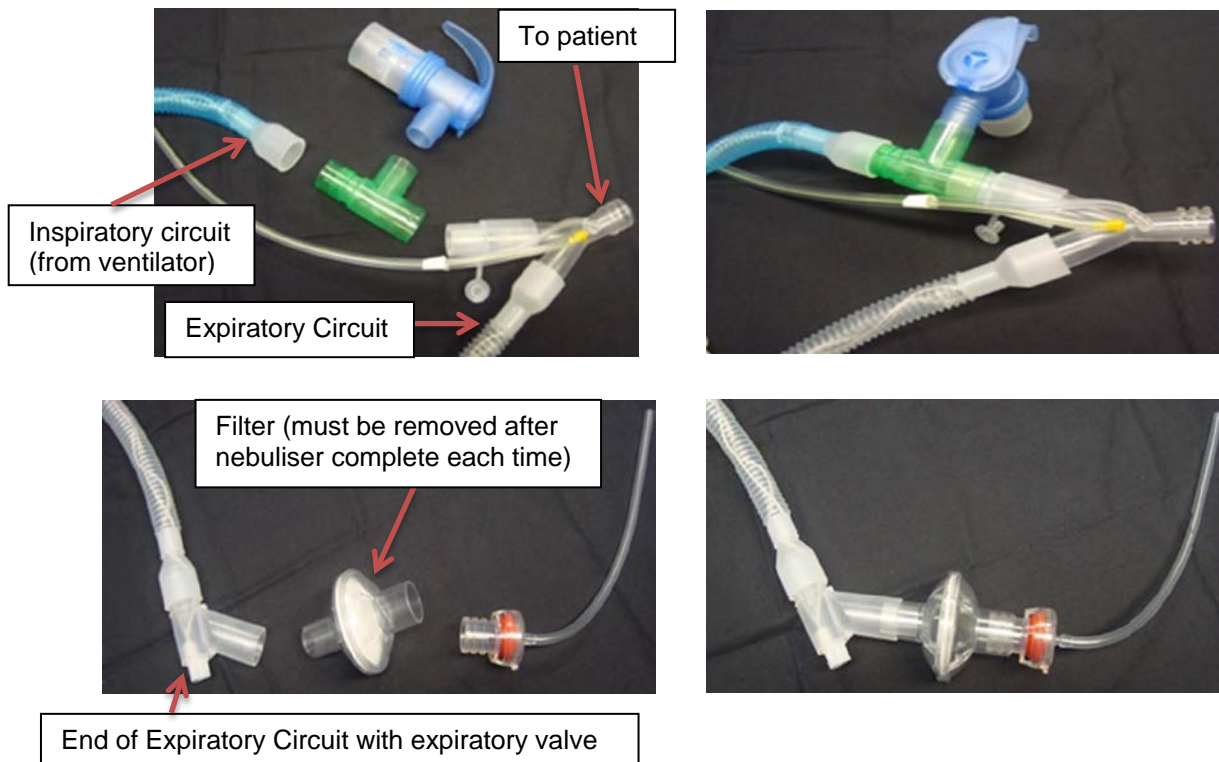


**FILTER:** If the patient is using a loan BIPAP/CPAP machine there should always be a filter on the circuit to protect the machine. If the machine is owned by the patient (so not ever used by another patient) there only needs to be a filter on the circuit during the time in which an antibiotic is being nebulised.  
The filter is best placed where the BIPAP/CPAP tubing connect to the machine.

Note: All parts pictured above are available from CHW Inhalation Therapy (except mask with strap & BIPAP/CPAP machine: patients should have their own, and may vary in style from the one pictured)



## 4.4 Patients on closed circuit ventilation



NB: The filter may alter the positive end expiratory pressure (PEEP). Please ensure the filter is removed when the nebuliser is complete

For **assistance with setting up a patient who is ventilated**, should discuss with the appropriate CNC.

- All nebuliser equipment pictured is available from Inhalation Therapy (patients on NIV will have their own mask with strap).
- The nebuliser, y connector, mouth piece and masks should be returned to Inhalation Therapy following use (once patient is discharged or treatment ceased). If a patient takes the nebuliser home to continue treatment you must ensure the original mouth piece with the expiratory valve or a suitable mask with an expiratory valve is placed on the nebuliser. Refer to [Giving Nebulised Antibiotics at Home](#) Homecare Guideline.
- For patients who are admitted regularly for administration of nebulised antibiotics 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 Pari LC sprint nebuliser.

NB: The nebuliser set up described above can also be used for medications other than antibiotics; however a filter system (as described and pictured above) would **not** be required so you must ensure the nebuliser has an expiratory valve.

Refer to the Homecare Guideline on "[Giving Nebulised Antibiotics at Home](#)" for pictures of different set-ups with an expiratory valve (without a filter). Also refer to "Asthma Inhaled Medications Administration Using Inhalation Devices Including Nebuliser":

<http://chw.schn.health.nsw.gov.au/o/documents/policies/guidelines/2006-8275.pdf>

## 5 Homecare Guideline

If the patient takes the nebuliser home for continued use, ensure they are sent home with a mouth piece or mask with an expiratory valve on it. Refer to:

- **Giving Nebulised Antibiotics at Home:**

<http://chw.schn.health.nsw.gov.au/o/documents/policies/homecare/2006-8121.pdf>

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