NEBULISER THERAPY SOP	
Version Number	*Version 2*
Date of Issue	*August 2020*
Reference Number	*NT-08-2020-WOB-V1*
Review Interval	*3 yearly*
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Document Review History		
Review Date	***Reviewed By***	***Signature***
August 2023		

Document Change History	
Change to Document	***Reason for Change***

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1.0 Introduction

"The aim of nebuliser treatment is to deliver a therapeutic dose of medication as an aerosol in the form of respirable particles within a fairly short period of time" (British Thoracic Society 1997 (BTS), Currie & Douglas 2007).

"Nebulisers are useful when large doses of inhaled medications are needed at a time when patients are too ill or otherwise unable to use handheld inhalers" (BTS 2007). Those caring for patients receiving nebuliser therapy should understand the advantages and limitations of nebulisers use.

2.0 Definition

Nebuliser: a device for changing a liquid into a mist of fine particles for inhalation. It is used to deliver drugs into the lungs via a mist of droplets small enough to reach the bronchioles and, in some cases, the alveoli.

The aim of nebuliser therapy is to safely and effectively deliver a therapeutic dose of the required drug to the patient as an aerosol in the form of respiratory particles (Irish Thoracic Society, 2016).

3.0 Indications for Use

The most common indication for nebuliser therapy in children is the emergency treatment of an acute asthma attack or in acute respiratory distress. Other indications include:

- When a child or young person has stridor
- Before physiotherapy to loosen secretions
- If child or young person is unable to use an inhaler.
- The medicine required is not available in an inhaler preparation *(Bennett 2003, Kelly and Lynes 2011)*.
- When large doses of nebulised antibiotics are required to treat or control persistent infections *(Daniels at al 2013).* Antibiotic nebulisers should be given after physio sessions

Nebuliser therapy is also indicated to deliver prophylactic medication such as Mucoid clearance, steroids and antibiotics. Always check antibiotics for specific side effects.

4.0 Types of Nebulisers and Drug Compatibility

Please see appendix 1 for type of nebulisers used at CHI Crumlin

*Drug Class	*Drug	*Nebuliser Requirement
β2 agonists	e.g. salbutamol	Jet nebuliser
Antimuscarinics (anticholinergics)	e.g. ipratropium bromide	Jet nebuliser
Combination Therapy	e.g. Salbutamol with ipratropium bromide	Jet nebuliser
Corticosteroids	e.g. Budesonide, Fluticasone	Jet nebuliser
Mucolytics	Normal saline, hypertonic 7%, Dornase alpha / DNase	Jet nebuliser

Antibiotics	Aztreonam	Altera Nebuliser Handset and Altera Aerosol Head connected to an eBase Controller or an eFlow® rapid Control Unit must only be used
	Colistimethate Sodium Tobramycin Meropenum	Breath assist open vent jet nebulisers e.g. PARI LC Plus®

5.0 Equipment and Assembly

- The nebuliser sets come with three components:
- The chamber (also called the 'pot' or 'acorn').
- A mouthpiece or mask (Mouthpieces should be used whenever antibiotics or steroids are nebulised to prevent their exhalation into the air and to minimise deposits of the drug on the child's face).
- And tubing

The chamber comes in three parts:

- The base of the chamber has a gas inlet. This is the part of the chamber that the solution should be put into and to the bottom of which the tubing is attached
- Over the gas inlet, there is a detachable mushroom shaped piece of plastic (the dispersal component). Without it the nebuliser would not work properly
- The top of the chamber is designed to screw back onto the base. It is also designed to accept either a mask or a mouthpiece for administration of the nebuliser

6.0 Complications associated with Nebulisation Therapy

Adverse side effects of nebulisation are usually considered to be drug related. These may include:

- Giddiness
- Tremor
- Tachycardia
- Nausea
- Dry mouth
- Wheeziness
- Bronchospasm
- Constipation

Nebulised solutions, which are cold, non-isotonic, and acidic or contain certain preservatives can cause bronchoconstriction. Following inhalation via a facemask it is advisable to wash the child's face to prevent skin irritation. It is also advisable following steroid inhalation to rinse out the mouth to avoid possible oral candidiasis.

7.0 Nebuliser Care

As nebulised drugs are delivered directly to the lungs they may be a source of infection if equipment is or becomes contaminated. Therefore, the nebuliser device should be cleaned post use with warm soapy water (briel) by separating the three components to prevent colonisation, rinsing with sterile water. Let the chamber and mouthpiece / facemask air dry or pat dry with paper towel if necessary. The nebuliser chamber should not be cleaned with a brush as this may cause damage. Discard the nebuliser unit after 1 week or if any discoloration, stickiness or cracking. This should be indicated on the safety checklist or the tubing labelled to comply with same. As per manufacturer's guidance, to ensure continued effectiveness and to minimise risk of cross-infection. All nebuliser equipment is single patient use only.

8.0 Respiratory Protection

Wear respiratory protection FFP3/FFP2, if engaging in aerosol generating procedures. When undertaking any cough inducing procedures on all patient's e.g. sputum induction, bronchoscopy, administration of aerosolised medications, airway suctioning, endotracheal intubation, caring for patients on ventilation and during treatment of lesions/abscesses when aerosolisation of drainage fluid is anticipated. (CHI, 2020).

ACTION	RATIONALE & REFERENCE
Outline to the patient/guardian of the need to administer a nebuliser.	To facilitate an appropriate explanation of nebuliser administration.
Ascertain any previous experience the patient has of receiving nebuliser therapy and how this was tolerated	To troubleshoot any previous issues and to identify what works best for the child
Decontaminate hands	(OLCHC 2010a, 2013)
All medications should be drawn up and administered according to the medication policy. Nebulised medication are independently double checked in the usual manner against the prescription kardex.	To minimise the risk of an incorrect dose being administered and to adhere to Policy (OLCHC, 2014, 2015, 2017).
In order to be effective, nebulisers should only be administered with volumes equal to or greater than 2.5ml and different medicines should be administered separately	There is always a residual amount of solution left at the end of nebulisation. In order to minimise the amount of drug "wasted" in this residue, a minimum starting volume of at least 2.5ml is recommended. There is a maximum volume of 10mls as per manufacturer's instructions
Syringes containing nebuliser solutions should not be taken to the patient at the same time as medications to be delivered by an alternative route (such as oral or intravenous)	To avoid potential errors in route of administration.
The most common nebuliser used in the hospital is the	Specific nebuliser systems are necessary to deliver

Cirrus™, although newer delivery systems are available involving an electronic delivery system for specific patients and nebulisers only.	the some antibiotics as these are only compatible with these as per manufacturer's instructions, including DNase I (dornase alpha, Pulmozyme), tobramycin (TOBI; Pari LC Plus nebulizer), and aztreonam (Cayston; Altera nebulizer) should only be delivered using nebulizers specifically approved by the drug manufacturer for use with these agents. Please see Eflow rapid nebuliser system guideline for further instruction.
The child should sit in an upright position with the nebuliser device and mask attached comfortably. Ensure there is a seal around the mask with no air escape. Encourage parent to position a smaller child on their lap and hold the nebuliser in front of the child's mouth and nose	Sitting upright allows for maximum lung expansion (Boe et al, 2001).
A set of observations should be recorded before commencement of the nebuliser, if this is to be administered for respiratory distress, stridor or asthma. The PEWS score should be recorded.	Baseline observations to monitor the patient's response to therapy recorded in PEWS.
The gas flow rate needs to be over 6L per minute to produce sufficiently small particles throughout the five to ten minutes of A typical administration (Kelly and Lynes, 2011; BTS 2016). Please refer to manufacturers guidelines for further instruction.	Ensures effectiveness of treatment and efficacy of prescribed medication. The Cirrus2 nebuliser is designed to deliver drugs for Tracheobronchial deposition. At a driving gas flow of 6-8 L/min, the Mass Median Diameter (MMD) is 3.1 microns. To reach the target airways, the droplet size should be less than 5µm (micrometers). However, if droplets become too small (less than 1µm), they are likely to be deposited in the peripheries of the lung, where they do not have a therapeutic effect (Boe et al 2001).
The child should be observed throughout the administration of the nebuliser treatment.	To clinically assess effectiveness of treatment.
Nebulisers take on average 5-10 minutes to administer (Bennett 2003)	Length of administration will vary according to the amount of solution used
The chamber does not empty completely and a residual volume of 0.5-1.5mL remains (Boe et al 2001). This	The nebuliser device should be cleaned post use with warm soapy water (briel) by separating the three components to prevent colonisation, rinse with

residual fluid should be discarded before the next nebulisation. Discard the nebuliser unit after 1 week or if any discoloration, stickiness or cracking. Nebuliser units should be changed every 48hrs in immunocompromised patients. Ensure the child is left in a comfortable position praising them for taking the nebuliser. Document the effect of the nebuliser in the child's HCR.	sterile water. The set should be labelled on the tubing to comply with same. As per manufacturer's guidance to ensure continued effectiveness and to minimise risk of cross-infection All nebuliser equipment is single patient use only. (NMBI, 2015)

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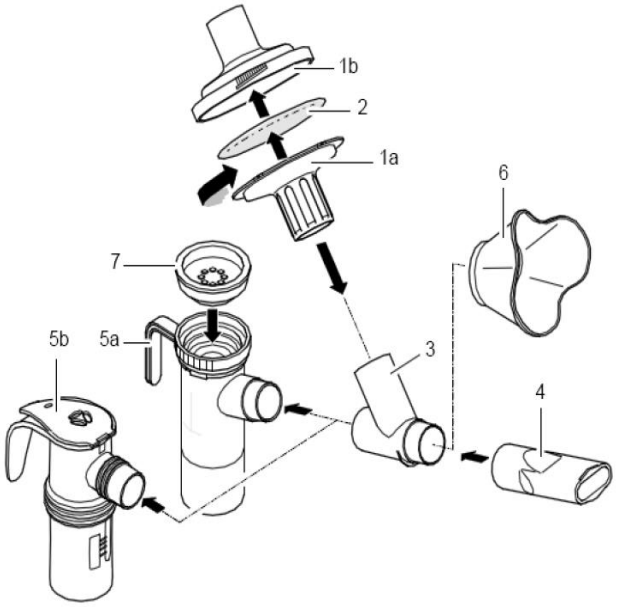
Appendix 1 - Cirrus™2 nebuliser breathing system available with mask or mouthpiece

Appendix 2 - Pari LC PLUS / LC SPRINT©



Appendix 3 - eFlow®rapid Nebuliser System

Appendix 4 – The Eflow Rapid Nebuliser System

THE EFLOW RAPID NEBULISER SYSTEM

Please N ote

Patients requiring nebulised Cayston, can only use their own eflow machine as this neb is compatible with eflow only.

This device is used 3 times daily but according to Manufacturers recommendations only need to be sterilised once daily at 121° C for 15 minutes.

DELIVERY AND COLLECTION OF THE EFLOW NEBULISER

Delivery of eflow nebuliser	This device will be delivered to the packing area in HSSD by a Health Care Assistant at the end of each day: approximately 12:00pm – 3:00pm. Please use extn: 2553 for assistance or directions. Please note: • Sterilising process takes approx 1 hour. • All devices are processed in order of priority so delays must be allowed for. • Notice needs to be given for any nebuliser needed urgently. • Any nebuliser that has been on a CRE Patient, needs to be labelled using a contaminated sticker.
Collection of eflow nebuliser	This device will be collected by Health Care Assistants from a basket labelled 'Cystic Fibrosis Unit' in the goods receiving area in HSSD by 3:00pm – 4:00pm daily or as needed.

TRANSPORTING, PACKAGING AND TRACKING THE EFLOW NEBULISER

- The eflow nebuliser shall be delivered to HSSD in a clear plastic bag and the person making the delivery, shall confirm with a member of HSSD that all parts are present and that the device has been disinfected and dried.
- HSSD staff will assemble the 5 parts of the eflow nebuliser and package the device in a view pack pouch with both ended sealed.
- Each child will be designated a specific barcode using the HSSD tracking system. Once scanned, this barcode will produce a label displaying the child's name. This label will be placed on the outside of the package and can be tracked throughout the tracking system.

DECONTAMINATION AND TAGGING OF THE EFLOW NEBULISER

Decontamination is the combination of processes (including cleaning, disinfection and sterilisation) used to render Reusable invasive medical devices safe for handling by staff and for use on patients. Effective decontamination of RIMC is an essential component in the prevention of Health Care Associated Infection (HSE 2007).

- The eflow nebuliser shall be disinfected and dried immediately after point of use and delivered to HSSD staff in the packing room.
- HSSD staff will assemble the eflow nebuliser and package it in a single view pack pouch.
- The pouch will be sealed by use of a heat sealer and the eflow nebuliser will be placed into an Autoclave and sterilised at 121°C for 15 minutes.
- Once sterilised and cooled the view pack pouch will be tagged with a batch label and delivered into the designated basket in the good receiving area to await collection.

Appendix 5 - Aerogen Solo© - Used in PICU only for ventilated patients