LRI Children's Hospital

Nebuliser administration in children

Staff relevant to:	Nurses and nurse associates undertaking nebuliser administration with children. This includes Child branch student nurses under supervision.
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Written by: Reviewed by:	S Moran E Trim
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Contents

1. Introduction

Nebulisers are designed to atomise liquid medications into fine mists for inhalation into the lungs (Booker 2007).

Indications for nebuliser use:

1. Where a patient has oxygen saturation levels <92%, oxygen driven nebulisation is required to maintain saturations during inhaled therapy.
2. If a patient needs an inhaled drug such as a mucolytic (recombinant human deoxyribonuclease (rhDNase) or saline solution of varying strength) or an antibiotic which is required as an inhaled formulation rather than oral or IV.

Consider nebuliser use:

1. Where a patient is perceived to require very high doses of inhaled bronchodilator medication.
2. Nebuliser use can be considered for patients who are unable to use other devices or in situations such as acute severe asthma where patient cooperation with other devices may be problematic (Boe et al 2001).

Related documents:

- Nebuliser Reduction During the COVID-19 Pandemic UHL Guideline Trust ref: B17/2020
- Nebuliser Use in the Ventilated Child Hypertonic Saline DNAse UHL Childrens Intensive Care Guideline Trust ref: C48/2016
- Asthma and Wheeze UHL Childrens Guideline Trust ref: D7/2020
- Tracheostomy UHL Childrens Hospital Guideline Trust ref: C48/2018
- Cystic Fibrosis - Inpatient Chest Exacerbation UHL Childrens Medical Guideline Trust ref: C36/2016
- Cystic Fibrosis Paediatric Prescribing UHL Childrens Hospital Guideline Trust ref: C35/2011 Inhaled drug formulary
- Croup UHL Childrens UHL Childrens Guideline Trust ref: D6/2019

This guideline needs to be used in conjunction with the UHL Consent and Infection Control policies to ensure the child receives safe care and children and families are able to understand the reasons for care to facilitate co-operation.

2. Guideline Standards and Procedures

Resources:

- Nebuliser 'pot' and oxygen/air source (or nebuliser system), length of tubing. Filter if required (see appendix 1)
- Appropriately sized facemask, mouthpiece or tracheostomy mask
- Nebuliser medication, diluent if required (usually 0.9% Sodium Chloride, Boe *et al* 2001) and completed prescription chart
- Supply of equipment for monitoring and recording respiratory rate and function. Peak flow meter (if appropriate).
- Multi-parameter monitor with facility for ECG tracing, pulse and oxygen saturations with appropriate leads/probes for age/size of child for child receiving nebulised Adrenaline
- Observation charts

NB. Any child with chronic respiratory problems having regularly nebulised treatment should have their own portable nebuliser system for home use; this system can also be used whilst they are in hospital (e.g. Pari-neb nebuliser system, E 'flow or Ineb). This includes children with the following:

- Cystic fibrosis
- Tracheostomy
- Bronchiectasis
- any form of non-invasive ventilation
- *NB. Asthma is **not** an indication for home nebulisation and as such should be carefully considered with the child's lead specialist respiratory consultant*

NB. Consider Metered Dose Inhaler (MDI) and spacer for children with mild to moderate acute asthma that do not require supplemental oxygen. The British Thoracic Society no longer recommends nebulisers for all acute asthma because MDI and spacer is as effective. However, nebulisers should always be used for those requiring supplemental oxygen or with life-threatening features. The driving gas should be oxygen in emergencies because there is a risk of oxygen desaturation whilst using air-driven nebulisers (LLRRPG 2018).

Safety considerations when administering nebulised medication

For all nebulised medication it is recommended that there is good ventilation and administration is away from others if possible. All staff and carers should try to minimise their exposure to nebulised medication where possible.

Certain nebulised medication such as nebulised antibiotics require use of a filter during administration as per the medication information. **Pregnant and breastfeeding staff** should avoid any exposure to these medications when nebulised. Patients should be encouraged to use a mouthpiece where appropriate and to maintain a good seal on the mouthpiece to minimise escape of nebulised antibiotics.

2.1 Procedure / Process for Nebuliser Administration	
No.	Action
1	If the nebuliser is to be administered for respiratory distress, stridor or asthma a set of observations should be recorded pre nebuliser.
2	For children with asthma, check whether peak flow should be recorded pre and post nebuliser. If so, record prior and 15 minutes following nebuliser and record on designated chart.
3	For a child with croup, record observations of pulse and respiratory rates, respiratory effort and oxygen saturations prior to administration of nebulised Adrenaline. Continue observations during Adrenaline nebuliser and for 3 hours afterwards because of risk of rebound phenomena during this time leading to increased severity of symptoms (BNFC 2018). - pulse - ECG - oxygen saturation - respiratory rate Hourly observations of above to be recorded and charted, to include respiratory effort. Appearance of side effects or increased symptoms to be notified immediately to relevant medical staff.
4	Obtain verbal consent from the child and their family to administer the nebuliser, use appropriate language to explain the procedure to the child.
5	Select appropriate size of face mask or mouthpiece if child is able to tolerate this. Facemasks should be applied closely to the face throughout administration (a gap of a few cm reduces lung deposition, Booker 2007). If appropriate for the child a mouthpiece is preferred for the administration of corticosteroids (to avoid contact with facial skin and eyes) anticholinergics (to avoid contact with eyes) and antibiotics (to avoid skin contact, Kelly 2011). It also results in higher lung deposition of the medication rather than via a face mask. For a child with a tracheostomy who is self-ventilating, ensure that a tracheostomy mask is used (never administer directly to tracheostomy tube). For a ventilated child administer via the ventilator circuit (see Tracheostomy UHL Childrens Hospital Guideline 2021)
6	Ensure that a filter system is incorporated into nebuliser if indicated e.g. nebulised antibiotics e.g.(see appendix 1 for diagram of set up)

7	Wash hands before preparing and administering nebuliser. Avoid touching the inside of the nebuliser pot to avoid contaminating reservoir (O'Malley 2015). Prepare and check medication in accordance with UHL medicine administration policy. Where a child is receiving a proportion of a nebule, dilute to a minimum of 2.5ml with 0.9% sodium chloride to ensure adequate droplet formation. Do not exceed a maximum of 5ml because this will reduce nebuliser performance and prolong administration time (Kelly 2011).
8	Use oxygen or air as indicated to generate aerosol formation of the medication. Ensure an appropriate flow rate is maintained to administer the nebuliser (follow manufacturer's guidance but generally: disposable system 5-8 litres per minute and 2-4 litres per minute for Pari-neb, Booker 2007). Run until characteristic 'spluttering sound is heard, gently tap the chamber and continue to run until 'spluttering' is heard again. Nebulisers take on average 5 to 10 minutes to administer depending on the volume nebulised. A residual volume of 0.5-1.5ml will remain and this liquid should be discarded at the end of nebulisation (Boe et al 2001). For children using their portable nebuliser system, this runs using air via a compressor and mains electricity.
9	If appropriate for the child encourage them to sit up straight to receive their nebuliser and take normal steady breaths with interspersed occasional deep breaths to optimise drug delivery (LLRRPG 2018). For younger children tilt the bed to give a more upright position if appropriate. If using a Pari nebulizer system, use the 'bendy arm' to facilitate nebulization in the lying/laid back position.
10	Clean the nebuliser 'pot' and mask/mouthpiece with soap and water in a disposable bowl. Rinse with sterile water (O'Malley 2015). Discard dirty water in the sluice. Leave covered to air dry between use. Disposable nebuliser equipment is for single patient use and should be changed at least every 7 days or earlier if equipment is damaged. If using a filter, remove after each dose and replace. Clean the nebulizer parts with household washing detergent and warm water, ideally as soon as possible after use. Portable nebulizer systems should be allowed to air dry

	or be dried using flow from oxygen supply/compressor. (See specific device manufacturer's guidance). For re-usable nebuliser equipment, once a week it is necessary to de-contaminate the pot, t-piece and mask/mouthpiece (see Appendix A) with Milton or a similar decontamination solution. Clean the nebulizer parts with household washing detergent and warm water, ideally as soon as possible after use. After making up the decontamination solution immerse the parts for approximately 20 minutes. Rinse carefully in cooled boiled water or sterile water and leave to air dry, preferably covered to protect from dust (O'Malley 2015). These measures reduce the risk of bacterial contamination which can then be transferred to the lungs. NB. When the child is receiving back to back nebulisers, full cleaning in-between each nebuliser is not required but residual medication should be removed between doses, if rinsing the chamber use sterile water.
11	Evaluate the effectiveness of medication and report findings to appropriate staff. If the nebuliser has been administered for respiratory distress, stridor or asthma a set of observations should be recorded post nebuliser.

3. Education and Training

No extra training requirements have been identified to enable implementation of this guideline

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrange-ments
Incident reporting	Electronic datix monitoring	Ward Sister	As occurs	Quality & Safety Board

5. Supporting References

BNFC. Treatment Summary: Croup: Management. 2018

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O'Malley, C (2015) Device cleaning and infection control in aerosol therapy. Respiratory Care. 60 (6) 917-930.

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6. Key Words

Asthma, Nebuliser, Nebuliser system, Respiratory

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) Eliza Trim – Children's respiratory nurse specialist	**Executive Lead** Chief Nurse
Details of Changes made during review: July 2022 Safety considerations when administering nebulised medication Updated guidance for administering nebulisers to a child with a tracheostomy specific to whether they are self-ventilating or not Air now added as an option to generate aerosol formation Updated cleaning and frequency of replacement guidance with caveat for when receiving back to back nebulisers	

Appendix 1. Assembly of filter for use with Colomycin nebuliser

1. Exhalation filter 1

    1a. Exhalation filter – lower part

    1b. Exhalation filter – upper part with expiratory valve

2. Filter pad (single use only)
3. Y connection
4. Mouthpiece without expiratory valve
5. Inspiratory valve
6. Nebuliser
7. Mask