

	Policies and Procedures Title: AEROSOLIZED MEDICATION FOR INHALATION - ADULTS Number: 1023
Authorization: [X] SHR Nursing Practice Committee	Source: Nursing Date Revised: March 2014 Date Effective: January 2010 Scope: SHR, Affiliates and CBO's

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Introduction

Aerosolization of medication and subsequent inhalation allows for deep penetration into affected areas of the lung. Aerosols may consist of particulate liquid or fine powder. A variety of medications can be delivered in aerosol form, usually to open narrowed airways.

Definition

Health Care Professional – for the purpose of this policy, Health Care Professional (HCP) will be used to refer to Registered Nurse (RN), Graduate Nurse (GN), Registered Psychiatric Nurse (RPN), Nurse Practitioner (RN(NP)), Licensed Practical Nurse (LPN), Graduate Licensed Practical Nurse (GLPN), Physician, Registered Respiratory Therapist (RRT), Pharmacist, Paramedic and nursing/respiratory/paramedic students.

1. PURPOSE

- 1.1 To ensure the safe and effective delivery of inhaled medications for the treatment and relief of symptoms caused by respiratory disease.

2. POLICY

- 2.1 Aerosolized medication will be administered by Health Care Professionals as ordered by SHR approved prescribers (see "Ordering of Medications Policy #7311-60-004).
- 2.2 Whenever possible, aerosolized medications should be delivered via metered dose inhaler (MDI) with or without a valved holding chamber (VHC) (ex. Aerochamber™ or Space Chamber®) or dry powder inhaler (DPI).
- 2.3 All small volume nebulizers will be administered with either medical air or an air compressor.

Note: *All medical air flow meters will be labeled as such and have an Air Guard attached to it to clearly distinguish this flow meter from oxygen flow meters. See Appendix H.*

- 2.4 For patients on additional precautions, follow SHR Infection Control Policies (Droplet #30-30, Airborne #30-20) to reduce transmission of infections to others (whenever possible, aerosolized medications delivered to these patients should be via MDI with or without a VHC or DPI).

3. PROCEDURES

- 3.1 Explain procedure to patient
- 3.2 Perform respiratory assessment.
- 3.3 If possible, position patient in semi-Fowler's or have patient sit upright.
- 3.4 Administer medication as ordered (see 2.2). See Appendices A-G for administration instructions.
- 3.5 For patients receiving non-invasive ventilation (NIV) (i.e. BiPAP, CPAP), remove NIV to administer medication. If patient is unable to tolerate temporary discontinuation of non-invasive ventilation, notify the physician. Where available, consult Respiratory Therapy for assistance.
- 3.6 For patients in urban settings receiving mechanical ventilation and requiring small volume nebulizers, please consult Respiratory Therapy. For those requiring MDI, please see Appendix C.
- 3.7 If treatment includes use of a corticosteroid:
 - Instruct/assist patient to rinse mouth with water, gargle then spit the water out at completion of treatment to prevent hoarseness, throat irritation, and oral candidiasis.
 - If a mask is used, instruct or assist patient to wash face after the treatment
- 3.8 Perform respiratory assessment following medication administration.
- 3.9 Document medication administration and patient's response on the appropriate record.

4. REFERENCES

Ari, A. & Restrepo, R. (2012). Aerosol delivery device selection for spontaneously breathing patients: 2012. *Respiratory Care*, 57(4), 613-626.

Canadian Lung Association. (2011). RESPTrec® Respiratory Training and Education Course. Canadian Lung Association (January 2011): Author.

Canadian Standards Association. (2008). Decontamination of reusable medical devices. Canadian Standards Association (March 2008). Mississauga, ON: Author.

Dolovich, M. B., Dhand, R. (2011). Aerosol drug delivery: developments in device design and clinical use. *The Lancet*, Vol 377, 1032 – 1045.

Gea, J., Orozco-Levi, M. & Gallart, Lluís. (2010). Increased inspiratory oxygen fractions (FIO₂) using a conventional drug delivery nebuliser. *Archivos de Bronconeumologia*, 46(5), 230-237

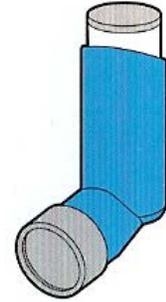
Teaching Handouts including pictures reproduced with permission from Jann Neumann of Saskatchewan Lung Association.

Appendix A

Nursing Resource for Teaching Use of Metered Dose Inhaler (MDI)

What is an MDI?

An MDI is a hand-held device that delivers a specific amount of medication in aerosol form. MDI is the preferred method of delivery over a small volume nebulizer because less medication is wasted, either by venting to the room, depositing ineffectively in the back of the mouth or nose, or through exhalation.



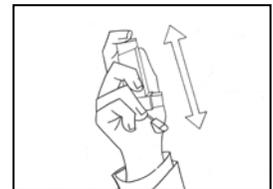
Medications Available:

- Salbutamol (AiroMir®, Ventolin®, generic brands)
- Ipratropium (Atrovent®)
- Fluticasone (Flovent®)
- Fluticasone and salmeterol (Advair®)
- Beclomethasone (Qvar®)
- Ciclesonide (Alvesco®)

How to use the MDI

Note: *If the inhaler is new or has not been used for more than five days, prime the inhaler by discharging two sprays into the air before using it.*

1. Remove the cap and shake the MDI.
2. Shake well.
3. Have the patient breathe normally and slowly through the mouth then breathe out.
4. Tilt chin up slightly.
5. Have the patient place the mouthpiece in the mouth between their teeth and close their mouth around it.
6. Have the patient begin to breathe in and push down on the canister once. Continue to breathe in slowly and deeply through the mouth until the breath is complete.
7. Remove the MDI from the mouth.
8. Have the patient hold their breath for 5-10 seconds then breathe out slowly.
9. Replace the cap.
10. If an additional inhalation is prescribed, wait 30 seconds before taking it, then repeat steps 2-10 for the prescribed number of inhalations.



Care of an MDI

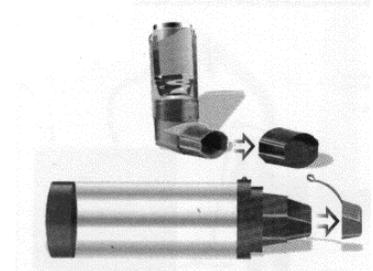
Once a week, remove the medication canister from the plastic casing and wash the casing in warm, soapy water. When the casing is dry, replace the medication canister in the casing and put the cap on the mouthpiece.

Appendix B

Nursing Resource for Teaching Use of Metered Dose Inhaler (MDI) with Valved Holding Chamber (VHC)

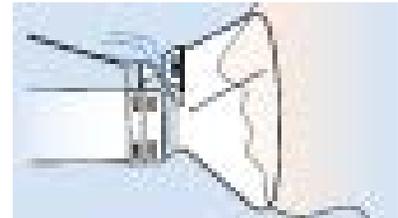
What is a VHC?

A VHC is an extension mouthpiece that attaches to a metered dose inhaler. VHC help overcome coordination problems people face when using MDIs alone. They allow you to breathe at your own pace. VHCs improve the delivery of medication to your lungs and prevent medication from escaping into the air. VHCs are available with a mouthpiece or a mask.



Medications Available:

- Salbutamol (Airomir®, Ventolin®, generic brands)
- Ipratropium (Atrovent®)
- Fluticasone (Flovent®)
- Fluticasone and salmeterol (Advair®)
- Beclomethasone (Qvar®)
- Ciclesonide (Alvesco®)



How to use an MDI with a VHC

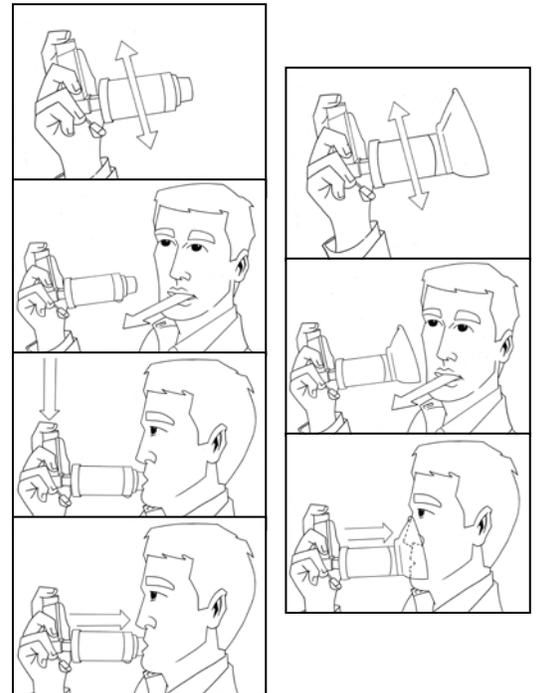
Note: *If the inhaler is new or has not been used for more than five days, prime the inhaler by discharging two sprays into the air before using it.*

1. Remove the cap and shake the MDI.
2. Remove the cap on the VHC if VHC has a mouthpiece.
3. Insert the mouthpiece of the MDI into the opening at the end of the VHC.
4. **If the VHC has a mouthpiece, place the VHC mouthpiece in the mouth between the teeth and** have the patient close their lips around the mouthpiece. If the VHC has a mask, apply the mask to face so there are no leaks between the face and mask. The valve will open with breathing. Have the patient exhale.
5. Push down on the MDI canister once to allow the medication to enter the VHC. Have the patient breathe in slowly and deeply for about 3-5 seconds. After the inhalation, have the patient hold their breath for 5-10 seconds.

Note: *Some VHC's will whistle if the patient is breathing too fast.*

Note: *If the patient has trouble breathing deeply and holding their breath or coordinating the timing of medication delivery with inhalation, have them breathe in and out more normally into the spacer 3 or 4 times.*

6. If the patient needs more than one dose, wait 30 seconds between inhalations and repeat steps 1-5 each time.
7. Replace the cap on the VHC (if VHC has mouthpiece) and on the MDI.



Care of VHC

1. Clean spacer as per manufacturer's recommendations.
2. Do not clean this equipment in sinks located in patient rooms or those used for hand hygiene instead use a clean vessel (ex. kidney basin).

Space Chamber®

1. Is to be cleaned once a week by immersing and agitating it in warm, mildly soapy water. Do not rinse. Shake off excess water and leave to air dry.

Appendix C

Nursing Resource for Use of MDI for the Patient on Mechanical Ventilator

1. Remove MDI from casing.
2. Shake the MDI.
3. Insert the MDI into the medication port on the ventilator tubing.
4. Deliver one puff of medication from the MDI during inspiratory phase of ventilation.
5. Remove MDI from medication port.
6. If more than one dose is required, wait 30 seconds between doses and repeat steps 2-5, or have multiple MDIs of the same medication and deliver one after the other following steps 2-5.

Appendix D

Nursing Resource for Teaching Use of Turbuhaler®

What is a Turbuhaler®?

A Turbuhaler® is a dry powdered inhaler (DPI) that is a breath-activated device used to deliver a powder form of medication to the lungs.

Medications Available in a Turbuhaler®:

- Budesonide (Pulmicort®)
- Formoterol (Oxeze®)
- Budesonide and formoterol (Symbicort®)
- Terbutaline (Bricanyl®)

How to use the Turbuhaler®

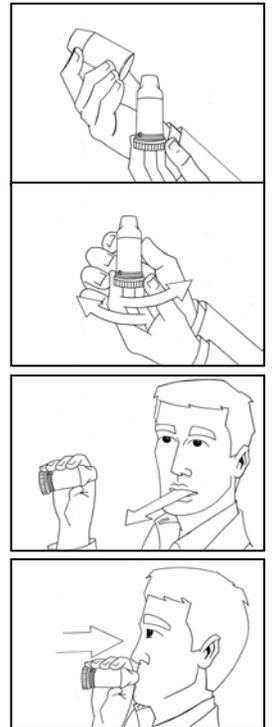
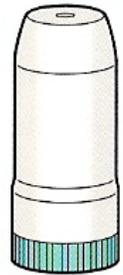
1. Unscrew and remove the cap.
2. Hold the Turbuhaler® in an upright position and turn the coloured base as far as possible in one direction, then turn back until a “click” is heard.

Note: Shaking or dropping the device now will cause the medication to be lost and the device will need to be re-primed by following the above directions.

3. Have the patient breathe out away from the Turbuhaler®.
4. Place the mouthpiece between the teeth and have the patient close their lips around it.
5. Have the patient breathe in quickly and deeply through the mouth. Remove the Turbuhaler® from mouth and hold breath for 5-10 seconds, then breathe out.
6. Repeat steps 2-5 for the prescribed number of inhalations.
7. Replace the cap.

Care of Turbuhaler®

1. Clean mouthpiece using a dry tissue or cloth, gently wiping away any particles which have collected inside the mouthpiece. Never wash the Turbuhaler®.
2. Check the number in the dose window to see how many doses are left.
3. Some Turbuhalers® may not have a window counter. When a red mark appears in the window underneath the mouthpiece, the Turbuhaler® has approximately 20 doses left. When the red mark reaches the bottom edge of the window the Turbuhaler® is empty.



Appendix E

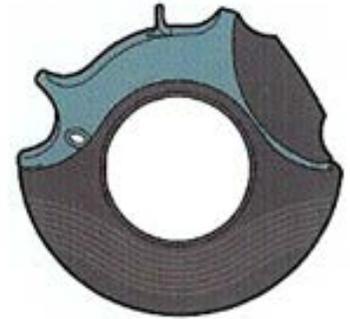
Nursing Resource for Teaching Use of Diskus®

What is a Diskus®?

A Diskus® is a breath-activated dry powder inhaler (DPI) containing a foil strip with medication blisters.

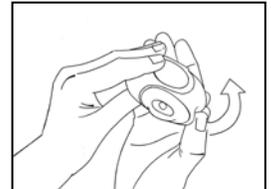
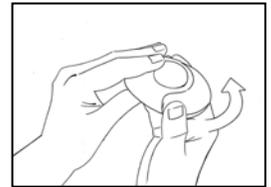
Medications Available in an Diskus®:

- Fluticasone (Flovent®)
- Salmeterol (Serevent®)
- Fluticasone and salmeterol (Advair®)
- Salbutamol (Ventolin®)



How to use the Diskus®

1. To open: hold the outer case in one hand and put the thumb of the other hand on the thumb grip.
2. Push the thumb as far as it will go until a click is heard.
3. Slide the lever as far as it will go until a click is heard.
4. Hold the Diskus® inhaler away from the mouth and have the patient breathe out completely. Tilt chin up slightly.
5. With mouthpiece to the lips, have the patient breathe in quickly and deeply.
6. Remove the Diskus® inhaler.
7. Have the patient hold their breath for 5-10 seconds, then breathe out slowly.
8. Close: slide the thumb grip as far as it will go until it snaps shut.



Care of Diskus®

1. Store the device in a dry place, not in a damp environment (ie, bathroom).
2. Diskus® is to be closed when not in use; only slide open when ready to take dose.
3. Diskus® is to be kept away from direct frost, heat or sunlight and from high temperatures (above 30 C).
4. Check the number of doses remaining in the dose window.

Appendix F

Nursing Resource for Teaching Use of HandiHaler®

What is a HandiHaler®?

A Handihaler® is a dry powder inhaler (DPI). The powder is from a capsule that is punctured.



Medications Available in a HandiHaler®:

- Tiotropium (Spiriva®)

How to use the HandiHaler®:

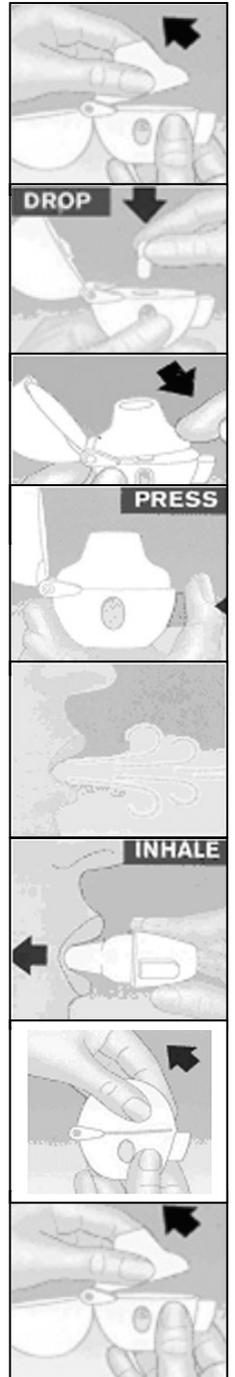
1. Fold and separate the two blister strips. Tear down the middle. Peel back foil on flat side, exposing one capsule at a time. Flip the blister strip over and let the capsule drop out.

Note: the capsules are sensitive to light and moisture.

2. Pull the lid upwards and lift open the mouthpiece.
3. Right before use, place one capsule in the capsule chamber.
4. Close the mouthpiece firmly until you hear a click, leaving the lid open.
5. Hold the HandiHaler® with the mouthpiece upright and press the piercing button once; release.
6. Have the patient breathe out completely away from the HandiHaler®. Close lips around mouthpiece. Tilt chin up slightly.
7. Have the patient breathe in slowly and deeply.
8. Remove HandiHaler® from the mouth while still holding their breath for 5-10 seconds.
9. Repeat steps 6-8 for a second breath in.
10. Open the mouthpiece and tip out the used capsule into the garbage. Close the mouthpiece and lid.
11. Wash hands after use to avoid eye contact with medication.

Care of HandiHaler®

1. The HandiHaler® needs to be cleaned once a month or as needed.
2. Open the lid and lift up the mouthpiece. Lift up the piercing button to open the base. Rinse the HandiHaler® with warm water to remove any powder. Do not use soap. Dry the HandiHaler® completely by leaving the lid, mouthpiece and base open to air-dry.



Appendix G

Nursing Resource for Teaching Use of Small Volume Nebulizer (SVN)**What is a Small Volume Nebulizer?**

A nebulizer is a method of taking a liquid medication and turning it into a fine mist with air which is then inhaled with breathing. The liquid medication is supplied in a single dosed pouch called a nebule. A small volume nebulizer can be administered by a mouth piece or a mask. A mouth piece is preferred to a mask as it decreases the deposition in the nasal passages (less medication wasted) and utilizes a more effective reservoir. A mask is required for adults who are physically unable to use a mouthpiece. Administration time will vary (may take up to 20 minutes) but will continue until mist can no longer be seen.

Medications Available for Nebulization:

- Fast Acting Bronchodilators:
 - Salbutamol (Ventolin®, Airomir®, generic brands)
 - Ipratropium bromide (Atrovent®, generic brands)
Note: Administration of ipratropium bromide (Atrovent®) could potentially exacerbate glaucoma if given by mask.
 - Combivent® (a combination of salbutamol and ipratropium)
- Corticosteroids:
 - Pulmicort® (budesonide)
- Antibiotics and Antifungal Agents:
 - Pentamidine: used to treat or prevent pneumocystis pneumonia (PCP) caused by *Pneumocystis jirovecii*
 - Ribavirin: used to treat respiratory syncytial virus (RSV)
 - Tobramycin (Tobi®): An [aminoglycoside antibiotic](#) used to treat various types of [bacterial](#) infections, particularly [Gram-negative](#) infections. Often administered to patients with [cystic fibrosis](#) for suppression of [Pseudomonas aeruginosa](#) infections.
- Others:
 - Epinephrine / Adrenaline: Used to treat bronchiolitis, epiglottitis, and croup.
 - Epoprostenol (Flolan®): A synthetic prostacyclin that when aerosolized and inhaled causes pulmonary vasodilation. Used in the treatment of pulmonary hypertension.
 - Morphine, Dexamethasone, and Salbutamol Combination: Used in palliative care to treat dyspnea.
 - Mucolytics: Act to thin mucus making it easier for the patient to expectorate. Examples: acetylcysteine (Mucomyst), dornase alpha (Pulmozyme)
 - Unpreserved Sterile Normal Saline: Has a soothing effect on airway mucosa. Used in the treatment of bronchiolitis, epiglottitis, and croup. May help loosen secretions.
 - Unpreserved Sterile Hypertonic Saline: An airway irritant. Used to stimulate cough and expectoration of sputum for analysis.
 - Xylocaine Topical 4%: Used for local anaesthesia of pharynx prior to awake intubation. Have patient keep eyes closed.

How to use a Nebulizer?

1. Have the patient get into a comfortable, upright sitting position.
2. Attach small volume nebulizer to tubing and attach tubing to air flow meter or air compressor.
3. Unscrew the nebulizer reservoir and add the medication. If needed you may add unpreserved sterile normal saline for more volume. Screw the top back on and attach the mouth piece/mask.
4. Either set the air flow meter to 6-10 liters/minute or turn the air compressor on. Ensure the medication is misting.
5. Place the mouth piece in the mouth or the mask on the face.
6. Ensure the nebulizer device is in an upright position in order for the medication to mist properly.
7. Instruct the patient to breath normally.
8. Continue treatment until the nebulizer is no longer producing mist.
9. Remove mouth piece or mask.
10. Turn off medical air flow meter or air compressor.

Care of Nebulizer

1. Wash and replace as per manufacturers recommendations.
2. Do not clean this equipment in sinks located in patient rooms or those used for hand hygiene instead use a clean vessel (ex. kidney basin).
3. Masks will be wiped after every use with Eccel wipes (SKU #203390) and left to air dry. Masks will be discarded when visibly soiled.
4. Tubing will be disposed of when visibly soiled.
5. Wipe air compressors with Eccel wipes (SKU #203390) for use between patients.
6. If the nebulizer cannot be washed per manufacturers recommendations nebulizer chamber and mouthpiece set up will be discarded after every dose.

AirLife™ Nebulizer

1. Is to be cleaned after every use in warm soapy water and rinsed well. Air dry or hand dry using a lint free cloth. Replace after 50 washes.

Appendix H



If medical air meter is not labelled as pictured above, please send it to clinical engineering to label before use.