Alberta Health Services

## Nebule to Metered Dose Inhaler Therapeutic Interchange – Respiratory Medications

***For Physicians and Nurse Practitioners –*** **revision effective March 23, 2020**

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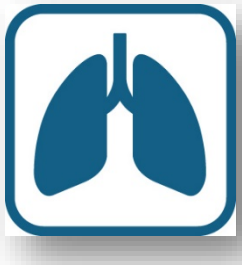
### The Case for MDI with Spacer

The use of MDI with spacer **speeds up effective medication delivery**, which benefits patients and providers alike. **Side effects** such as increased heart rate, tremors, nausea, vomiting, and cough may be reduced[2,3,4]. MDI with spacer **reduces risk of exposure** and supports safest practice at all times, including COVID-19 pandemic and the Precautionary Principle established during the SARS epidemic[1, 5].

Furthermore, rather than waiting until discharge, ordering MDI with spacer while in hospital enables patients to be well supported in proper device technique. This in turn may improve patients' **efficacy of self-management** - decreasing their future visits to hospital while improving their productivity and quality of life.



### The Limitations of Nebulized Therapy

Nebulizers are an aerosol generating medical device (AGMP) which can carry bacteria and viruses due to the particle sizes averaging between 1- 5microns. As such, Personal Protective Equipment (PPE) should ideally be worn whenever using such devices. The larger particles stimulate the patient's cough mechanisms, which increase the **risk of disease spread**[1]. All respiratory devices, including nebulizer masks and tubing, are considered semi-critical and require cleaning and high-level disinfection between each use.

Nebulization requires **more delivery time** and greater dosages of medication than metered dose inhaler (MDI) as the particles are larger and will impact the upper airway leaving medication in the throat, which is then systemically absorbed and may result in **greater side effects** than MDI. Nebulization for the treatment of acute asthma is, on average, 5 times the greater dosage than MDI (range 1 to 13 times); nebulizer standard salbutamol (Ventolin®) dosage for a patient weighing 20 kg or more is 5 mg while the equivalent of 10 puffs MDI is 1 mg. Using less medication to achieve positive results with minimal side effects provides the best patient care experience. MDIs have a smaller particle size for greater deposition further into the lower, smaller airways where the medication is required; the result is fewer side effects including systemic effects on heart rate[2,3,4].

### Respiratory Interchange Details

- Any order for non-neonate/non-NICU **nebulized therapy is restricted to**:
    1. Severe asthma or status asthmaticus; **OR**
    2. Patients who cannot be treated with MDI and spacer; **AND**
    3. Orders adherent to one of these reasons MUST indicate 'Do Not Sub' and MUST indicate one of these above-listed reasons

For more details contact your site's pharmacist or email respiratoryhealth.scn@ahs.ca.
Respiratory Health Strategic Clinical Network™ and Health Professions Strategy & Practice

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- This therapeutic interchange has the lowest complexity **level 1 (effective Mar. 23, 2020)**, meaning that no patient-specific information is required and minimal pharmacist assessment is required.
- When a medication order is received for nebulized salbutamol (e.g. Ventolin®), ipratropium (e.g. Atrovent®), budesonide (e.g. Pulmicort®) or ipratropium/salbutamol (e.g. Combivent®), it will automatically be interchanged to MDI with spacer except in the circumstances listed above.

- Full details of the interchanged dosages are available through your onsite pharmacist.

- As with any medication change, it's important for a regulated health professional to do a patient assessment of dose response and side effects.

- When patients are admitted from Emergency Departments or other triage settings, staff should ensure all MDIs and spacers are transferred along with the patient.

- All MDIs and spacers are considered single patient use only.

### Costs:

Provincial pharmacy services continues to gather nebule and MDI/spacer usage for the province, for all impacted medications. Combined with the experience of sites and zones that had previously made this practice change and including the cost of the various spacers, they are comfortable with the costs of this new practice. Cost analysis gives confidence that overall increase to direct costs will be negligible - with significant benefits gained.


1. Public Health Agency of Canada. 2011. Prevention and Control of Influenza during a Pandemic for All Healthcare Settings. Annex F. Retrieved from http://www.phac-aspc.gc.ca/cpip-pclcpi/assets/pdf/ann-f-eng.pdf.
2. Comparison of the effectiveness of inhaler devices in asthma and chronic obstructive airways disease: a systematic review of the literature, D Brocklebank, F Ram, J Wright, P Barry, C Cates, L Davies, G Douglas, M Muers, D Smith, J White. Health Technology Assessment 2001;Vol 5: No.26
3. Dolovich MB, Ahrens RC, Hess DR, Anderson P, Dhand R, Rau JL, Smaldone GC, et al. Device Selection and Outcomes of Aerosol Therapy: Evidence-Based Guidelines: American College of chest Physicians/American College of Asthma, Allergy, and Immunology. Chest 2005;127:335-71.
4. Cates CJ, Crilly JA, Rowe BH. Holding chambers (spacers) versus nebulizers for beta-agonist treatment of acute asthma. *Cochrane Database of Systematic Reviews* 2006, Issue 2. Art. No.: CD000052. DOI: 10.1002/14651858.CD000052.pub2.
5. 2007, Final Report of the SARS Commission, Toronto.



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