













Inhaled Medicated Devices for COPD: Prescriber and Patient Considerations - December 2022

DEVICE	HFA MDI, AEROSPHERE ⁷ 	RESPIMAT ⁷ 	BREEZHALER ⁷ , HANDIHALER ⁷ , AEROLIZER ⁸   	TURBUHALER ⁷ 	DISKUS ⁷ 	GENUAIR ⁷ 	ELLIPTA ⁷ 	INHUB ⁸ 
	Aerosol	Soft Mist Inhaler	Dry Powder Inhaler (capsules)	Dry Powder Inhaler (pre-loaded)				
	Low inspiratory flow required (slow deep breath)		Breath actuated; minimal hand-breath coordination required					
PROS	Ready to use (shake well prior to use) Spacer ^A +/- mask (useful for cognitive/physical impairment, poor coordination)	Minimal coordination for administration (slow release of fine particle liquid mist) Dose counter (locks when empty)	Capsule is pierced once before inhalation of powder. Can verify correct inhalation of dose by viewing empty capsule contents and hearing a rattling/whirling sound No dose counter required; can track doses by # capsules	Dose counter (every 20 doses; zero = empty) Dose <i>not</i> lost if base turned multiple times during prep; audible click when ready)	Dose counter (exact number) Audible click heard when dose is ready (slide thumb grip to open; slide lever to load dose)	Dose counter (every 10 doses; locks when empty) Window changes green to red and audible click when dose taken correctly	Dose counter (exact number and large font) Audible click when dose loaded properly (open cap fully)	Dose counter (exact number; zero = empty and lever locks) Audible click when dose is ready (yellow lever pushed down fully)
CONS	Strong hand-breath coordination required (spacer recommended ^A) No dose counter (except Aerosphere) Priming required ^B May have negative environmental impact*	Requires strength and dexterity to assemble cartridge into inhaler (pharmacist can pre-load when dispensing; 90 day expiry once assembled/loaded) Priming required ^B	Adequate inspiratory flow required (quick forceful breath); capsules/powder may be sensitive to heat/moisture/light					
			Loading capsules may be difficult for some users (e.g., cognitive impairment or poor dexterity) Capsules may be inadvertently swallowed rather than inhaled Pieces of capsule may be inhaled if pierced more than once	Dose counter is not accurate if base turned multiple times during dose prep/loading	4-6 week expiry once removed from protective packaging (except salbutamol = 1 year)	60-90 day expiry once removed from protective packaging	Dose lost if open & close cap without inhalation Expires 6 weeks after removed from packaging	30 day expiry once removed from protective packaging
			Avoid tipping					

Adapted with permission from RxFiles⁶; Images^{7,8}; HFA=Hydrofluoroalkane; MDI=Metered Dose Inhaler; ^ASpacer + MDI = ↑ lung/↓ oropharyngeal drug deposition, ↓ need for hand-breath coordination; Follow manufacturer storage, cleaning, expiry date and administration recommendations for all devices; ^B Priming instructions with 1st use and re-priming following non-use differ between the various MDIs

Considerations when choosing a device → Proper use = better therapeutic outcome¹⁻⁴

- Patient *preferences* (i.e., design, convenience, administration time)
- Patients' cognitive and physical abilities to use the device
- Avoid using multiple different types of inhaler devices, when possible
- Proper device training/teaching (demo, visuals, ongoing re-evaluation)
- Common errors preventing full dose involve device misuse/improper technique

*Device impact on the environment⁵

- MDI propellants contain hydrofluoroalkane (HFA), a greenhouse gas
- It has been estimated that 100 MDI doses (200 actuations) has the same carbon impact as a 290 km automobile ride.
- To lessen impact, ensure proper inhaler use (encourage spacer with MDI), and/or consider propellant-free alternatives (e.g., mist, powder), when appropriate.



Resources:

- 2022 Gold Report (COPD guideline): <https://goldcopd.org/>
- 2019 Canadian Thoracic Society COPD guideline: <https://cts-sct.ca/>
- NS Pharmacare: <https://novascotia.ca/dhw/pharmacare/>
- Cascades Canada Sustainable Healthcare: <https://cascadescanada.ca/>
- Canadian Lung Association: How to use your inhaler: <https://www.lung.ca/lung-health/how-use-your-inhaler>

References: 1) Usmani, OS. Ther Clin Risk Manag (2019) 15:461-472 <https://doi.org/10.2147/TCRM.S160365>
 2) Kaplan A et al. Can Resp Journal. (2018) <https://doi.org/10.1155/2018/9473051> 3) Sanaullah T et al. Cureus. (2020) 12(9) <https://doi.org/10.7759/cureus.10569> 4) Terry PD Adv Ther (2020) 37: 1812-1828 <https://doi.org/10.1007/s12325-020-01289-y>
 5) Cascades Canada accessed August 25, 2022 <https://cascadescanada.ca/resources/all-topics/inhalers/> 6) Crawley A et al. Asthma & COPD: Inhalation Devices Chart (2021) www.rxfiles.ca 7) Image accessed Dec 16, 2022 from https://www.flickr.com/search/?sort=date-taken-desc&safe_search=1&tags=chestheartstrokescotland&user_id=136036742%40N03&view_all=1 created by Chest Heart and Stroke Scotland, University of Edinburgh licensed under creativecommons.org/licenses/by-nc-sa/4.0/ 8) Image accessed Dec 16, 2022 from https://www.researchgate.net/figure/mage-of-a-Breezhaler-R-and-b-Aerolizer-R_fig1_350401347 licensed under <https://creativecommons.org/licenses/by-nc/4.0/>

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Alliance of Nova Scotia and with contributions from Tim Trites & Mariah Greene (pharmacy students); Available at: <https://medicine.dal.ca/departments/core-units/cpd/programs/academic-detailing-service/AC-Service-Resources.html>

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INHALED MEDICATED DEVICES FOR COPD - December 2022

DRUG NAME (Trade)	DEVICE ¹ - DOSE per INHALATION	ADULT DOSE (max daily) ²	COST PER DEVICE ³	Nova Scotia Pharmacare Status ⁴
Short Acting Beta₂ Agonist (SABA)				
Salbutamol (Ventolin, Airomir, generics)	Diskus – 200 mcg/inh	1 inh QID PRN (800 mcg)	\$11/60 doses (<i>generic NA</i>)	Full benefit
	HFA MDI – 100 mcg/inh	1-2 inh QID PRN (800 mcg)	\$6/200 doses (<i>generic</i>)	
Terbutaline (Bricanyl)	Turbuhaler – 500 mcg/inh	1-2 inh PRN (3000 mcg)	\$11/120 doses	
Short Acting Muscarinic Antagonist (SAMA)				
Ipratropium (Atrovent, generics)	HFA MDI – 20 mcg/inh	2 inh TID-QID (240 mcg)	\$22/200 doses (<i>generic</i>)	Full benefit
SABA + SAMA				
Salbutamol + ipratropium (Combivent)	Respimat – 100/20 mcg/inh	1 inh QID (600/120 mcg)	\$33/120 doses	Full benefit
Long Acting Beta₂ Agonist (LABA)				
Salmeterol (Serevent)	Diskus – 50 mcg/inh	1 inh BID (100 mcg)	\$72/60 doses	Exception criteria: Dx. COPD ⁴ and persistent symptoms i.e., MRC ≥ Grade 3 or CAT score ≥ 10 and FEV ₁ < 80% predicted OR ≥ 2 moderate exacerbations in the previous year requiring antibiotics and/or systemic corticosteroids; OR at least 1 hospitalization for acute severe COPD exacerbation.
Formoterol (Foradil Aerolizer)	Aerolizer – 12 mcg/inh	1-2 inh BID (48 mcg)	\$60/60 doses (<i>capsules</i>)	
Long-Acting Muscarinic Antagonist (LAMA)				
Umeclidinium (Incruse)	Ellipta – 62.5 mcg/inh	1 inh once daily (62.5 mcg)	\$54/30 doses	Exception criteria for LAMA inhaler alone is the same as LABA above. OR For triple therapy when LAMA is given in combination with a LABA/ICS in pts. experiencing inadequate control* after ≥ 2 months of treatment with a LABA/ICS or LABA/LAMA (i.e., switching to LABA/ICS + LAMA). *Inadequate control defined as persistent Sx. or ≥ 2 COPD exacerbations in the previous year treated with antibiotics and/or systemic corticosteroids; OR least 1 COPD exacerbation requiring hospitalization
Tiotropium (Spiriva)	Respimat – 2.5 mcg/inh	2 inh once daily (5 mcg)	\$59/60 doses	
	Handihaler – 18 mcg/inh	1 inh once daily (18 mcg)	\$59/30 doses (<i>capsules</i>)	
Acclidinium (Tudorza)	Genuair – 400 mcg/inh	1 inh BID (800 mcg)	\$58/60 doses	
Glycopyrronium (Seebri)	Breezhaler – 50 mcg/inh	1 inh once daily (50 mcg)	\$58/30 doses (<i>capsules</i>)	
LABA + LAMA (LABA/LAMA)				
Formoterol + acclidinium (Duaklir)	Genuair – 12/400 mcg/inh	1 inh BID (24/800 mcg)	\$66/60 doses	Exception criteria: Dx. COPD ⁴ and persistent symptoms i.e., MRC ≥ grade 3 or CAT score ≥ 10 after ≥ one month of treatment with a LAMA or LABA.
Indacaterol + glycopyrronium (Ultibro)	Breezhaler – 110/50 mcg/inh	1 inh once daily (110/50 mcg)	\$84/30 doses (<i>capsules</i>)	
Olodaterol + tiotropium (Inspiolto)	Respimat – 2.5/2.5 mcg/inh	2 inh once daily (5/5 mcg)	\$70/60 doses	
Vilanterol + Umeclidinium (Anoro)	Ellipta – 25/62.5 mcg/inh	1 inh once daily (25/62.5 mcg)	\$96/30 doses	
LABA + Inhaled Corticosteroid (ICS) (LABA/ICS)				
Salmeterol + fluticasone (Advair, generics)	Diskus – 50/250 & 50/500 mcg/inh	1 inh BID (100/1000 mcg)	\$51 & \$72/60 doses (<i>generic</i>)	Exception criteria: Dx. COPD ⁴ and LABA/ICS given in combination with a LAMA in pts. experiencing inadequate control* after ≥ 2 months of treatment with a LABA/LAMA. (i.e., switching to LABA/ICS + LAMA). *Inadequate control defined as persistent Sx. or ≥ 2 COPD exacerbations in the previous year treated with antibiotics and/or systemic corticosteroids OR at least 1 COPD exacerbation requiring hospitalization.
	Inhub – 50/250 & 50/500 mcg/inh	1 inh BID (100/1000 mcg)	\$51 & \$72/60 doses (<i>generic NA</i>)	
Vilanterol + fluticasone (Breo)	Ellipta – 25/100mcg	1 inh once daily (25/100 mcg)	\$101/30 doses	
Formoterol + budesonide (Symbicort)	Turbuhaler – 6/200 mcg/inh	2 inh BID (24/800 mcg)	\$98/120 doses	
LABA + LAMA + ICS				
Vilanterol + umeclidinium + fluticasone (Trelegy)	Ellipta – 25/62.5/100 mcg	1 inh once daily (25/62.5/100 mcg)	\$149 & \$164/30 doses	Exception criteria: Dx. COPD ⁴ and ≥ 2 months of LABA/LAMA and experiencing persistent Sx. OR ≥ 2 exacerbations in the previous year treated with antibiotics and/or systemic corticosteroids; OR at least 1 hospitalization for acute COPD exacerbation. Not for initial COPD therapy.
Formoterol + glycopyrronium + budesonide (Breztri)	Aerosphere – 182/8.2/5.8 mcg/inh	2 inh BID (728/32.8/23.2 mcg)	\$138/120 doses	

¹Additional inhalers/strengths indicated only for **asthma are not included in this table/tool**; ²Canadian Product Monographs; ³McKesson Canada (without mark-up & fees); ⁴All inhalers listed with exception criteria require a diagnosis of COPD as defined by spirometry (post-bronchodilator FEV₁/FVC ratio < 0.7); for detailed criteria for coverage see [Nova Scotia \(NS\) Pharmacare criteria for coverage of exception status drugs](https://novascotia.ca/dhw/pharmacare/exception-status-drugs.asp): <https://novascotia.ca/dhw/pharmacare/exception-status-drugs.asp>. CAT = COPD Assessment test; Dx = diagnosis; HFA = Hydrofluoroalkane; inh = inhalation; MDI = metered dose inhaler; MRC = Medical Research Council Dyspnea scale; pts = patients; Sx = symptoms; BID = twice daily; TID = three times daily; QID = four times daily; PRN = as needed; NA = not available. The use of **single inhaled corticosteroid agents, i.e., fluticasone (Flovent®) and budesonide (Pulmicort®)**, both of which are fully covered by NS Pharmacare, are not recommended as monotherapy for the treatment of COPD and should only be used in combination with other agents. **Nebules** are mainly used/reserved for acute care settings or for situations where MDI + spacer device is unsuitable (i.e., young children, elderly, physical/cognitive barriers); NS Pharmacare exception criteria for coverage apply.

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