

<p>What is it?</p> <ul style="list-style-type: none"> Progressive, partially reversible airway limitation Damage to the walls of the lungs → reduced elasticity → reduced ability of patient to exhale 4th leading cause of death in Canada; prevalence ~5% Primary cause (85% of cases) is smoking An estimated 15-20% of smokers develop COPD 	<p>Symptoms: Cardinal triad: dyspnea, chronic cough, and sputum production. Dyspnea is typically progressive, worsens with exercise, persistent; described as gasping.</p> <p>Definitions: Emphysema describes the damage to the lungs. Chronic bronchitis is defined as increased cough and sputum. Most COPD patients have features of both.</p> <p>Diagnosis: Spirometry post-bronchodilator FEV₁/FVC < 0.7</p>	<p>Indicators: symptoms (dyspnea, cough, sputum), smoking history (10-20 pack-years or more), family history of COPD, environmental exposure to dust/chemicals. Screen for α₁-antitrypsin deficiency in select patients (e.g. if atypical features, disease onset <45 years).</p> <p>Goals of therapy: ↓ dyspnea, ↑ exercise tolerance, ↑ quality of life, & ↓ complications such as exacerbations & cor pulmonale.</p> <p>Comorbidities: common, especially depression and CV disease.</p>
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Therapeutic Pearls / Nonpharmacologic Approach FOR ALL PATIENTS	
<ul style="list-style-type: none"> An estimated 50% of patients are non-adherent to COPD therapy and 50% of patients cannot demonstrate proper inhaler technique! Reassess at every visit. Establish individualized action plan e.g. respiratoryguidelines.ca/updated-cts-copd-action-plan Pulmonary rehab has proven benefits in symptomatic and recently hospitalized patients (NNT = 4 to prevent one hospitalization in patients with recent exacerbation) 	<ul style="list-style-type: none"> Encourage smoking cessation. Benefits (40% ↓ in both death & rate of lung function decline) apparent even in severe COPD ("never too late to quit!") Annual influenza vaccine ↓ death by up to 50% and hospitalizations by up to 40% Pneumococcal vaccine recommended by guidelines (x1 dose, ?repeat in 5-10 years in severe COPD); however, only weak evidence of benefit available

An Approach to Treatment	Pharmacotherapy	General Agents
<p>STEP 1: Start short-acting bronchodilators.</p> <p>Start here if: mild COPD, or \$ barriers to LAMA or LABA</p>	<ul style="list-style-type: none"> SAMA ± SABA Benefit: ↓ symptoms, may not ↓ AECOPD/hospitalizations 	<ul style="list-style-type: none"> SABA: salbutamol VENTOLIN, terbutaline BRICANYL • SAMA: ipratropium ATROVENT • Combo: salbutamol/ipratropium COMBIVENT
<p>STEP 2: Reassess inhaler technique.* Start long-acting agents.</p> <p>Start here if: moderate to severe COPD</p> <p>Move here if: treatment failure in Step 1</p>	<ul style="list-style-type: none"> LAMA + SABA PRN or LABA + SABA PRN ± SAMA PRN Benefit: ↓ symptoms, ↓ AECOPD/hospitalizations LAMA often preferred as it may have ↑ efficacy/tolerability vs LABA 	<ul style="list-style-type: none"> LAMA: tiotropium SPIRIVA, aclidinium TUDORZA, glycopyrronium SEEBRI, umeclidinium INCRUSE • LABA: formoterol OXEZE, salmeterol SEREVENT, indacaterol ONBREZ, olodaterol STRIVERDI
<p>STEP 3:</p> <p>Reassess inhaler technique* Optimize long-acting agents.</p> <p>Move here if: treatment failure in Step 2</p>	<p>Poor symptom control:</p> <p>Maximize bronchodilator therapy first, since AE are associated with adding ICS</p> <p>Frequent AECOPD (≥1 year):</p>	<ul style="list-style-type: none"> LAMA + LABA: single agent products as above, or LAMA + LABA combinations: aclidinium + formoterol DUAKLIR; glycopyrronium + indacaterol ULTIBRO; tiotropium + olodaterol INSPITO; umeclidinium + vilanterol ANORO LABA + ICS combinations: formoterol + budesonide SYMBICORT; salmeterol + fluticasone ADVAIR; vilanterol + fluticasone BREO
<p>STEP 4: Reassess inhaler technique.* Specialist Referral.</p> <p>Move here if: COPD severe or unresponsive to therapy; α₁ antitrypsin deficiency; exacerbations severe/recurrent; respiratory failure; ? in diagnosis/management; symptoms disproportionate to FEV₁</p>	<ul style="list-style-type: none"> LAMA + (ICS+LABA) + SABA PRN Benefit: ICS+LABA ↓ AECOPD/hospitalizations vs LABA alone {If on LAMA+LABA+ICS→ option to stop ICS: similar exacerbation risk} <small>WISDOM</small> oxygen therapy • theophylline low dose UNIPHYL or roflumilast DAXAS • prophylactic azithromycin ZITHROMAX • n-acetylcysteine 	

*Refer to a pharmacist or COPD Educator to review inhaler technique with the patient. Teaching sheets available online at www.RxFiles.ca & patient handouts at sk.lung.ca/health-professionals/resources/resptrec-resources

FEV ₁	MRC	Symptom/Disability	COPD Stage	Should I choose a LAMA or a LABA?
≥ 80%	1	Not troubled by breathlessness except with strenuous exercise.	At Risk	<p>Should I choose a LAMA or a LABA?</p> <p>Both will improve symptoms; LAMAs (tiotropium) may be superior in ↓ exacerbations (but unclear if this applies to newer agents). LAMAs may also be better tolerated than LABAs (↓ withdrawal in RCTs). Often in clinical practice, LAMAs are the preferred starting point.</p> <p>Which LAMA / which LABA should I choose?</p> <p>Consider: evidence (tiotropium, salmeterol, & formoterol are the most studied), device-specific advantages (see Asthma & COPD: Inhalation Devices), adherence (once vs twice daily regimens), & onset (see COPD: Drug Comparison Chart). If a patient frequently makes mistakes using their device, re-educate or consider a switch to an alternate device.</p>
	2	Short of breath when hurrying on the level or walking up a slight hill.	Mild	
50-79%	3	Walks slower than most people of the same age on the level because of breathlessness, or has to stop for breath when walking at own pace on the level.	Moderate	
	4	Stops for breath after walking about 100 meters (~ 1 block) or after a few minutes on the level.		
30-49%	5	Too breathless to leave the house, or breathless when dressing or undressing.	Severe	
< 30%			Very Severe	

<p>Management of AECOPD (acute worsening of symptoms over >48 hours): ① Initiate scheduled salbutamol and ipratropium; long-acting inhalers can be continued but should not replace short-acting bronchodilators. ② Initiate prednisone 30-50mg po daily x 5 <small>REDUCE</small> - 10days. ③ Add antibiotic if both change in sputum purulence (colour) AND at least one of increased sputum volume or increased dyspnea vs baseline. Antibiotics should also be strongly considered if patient requires hospitalization. Antibiotic choice: amoxicillin, doxycycline, TMP/SMX, clarithromycin, azithromycin, cefuroxime, or cefprozil for low risk patients; amoxi-clav, levofloxacin, or moxifloxacin for high risk patients (high risk: severe COPD, coronary artery disease, chronic steroids, ≥ 4 exacerbations/yr, home oxygen, or recent antibiotics).</p>	<p>Prevention of AECOPD: optimization and adherence to meds; vaccinations (influenza, pneumococcal); avoid environmental triggers; smoking cessation; pulmonary rehab.</p>
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AE=adverse events AECOPD=acute exacerbation of COPD CV=cardiovascular DPI=dry powder inhaler FEV₁=forced expiratory volume in 1 second FVC=forced expiratory vital capacity ICS=inhaled corticosteroid LABA=long-acting Beta2-Agonist LAMA=long-acting muscarinic antagonist MRC=Medical Research Council dyspnea scale SABA=short-acting Beta2-Agonist SAMA=short-acting muscarinic antagonist TMP/SMX=trimethoprim/sulfamethoxazole

	GENERIC/TRADE (Strength & formulations)	USUAL DOSE [MAX DAILY DOSE]	COMMENTS / ADVERSE EVENT AE / CONTRAINDICATIONS CI / DRUG INTERACTIONS DI / MONITORING M	Canada USA \$/30 day	
Anticholinergics	Short-Acting Muscarinic Antagonist (SAMA): binds unselectively to pulmonary muscarinic receptors, reducing smooth muscle contraction. Duration 4-6 hours. 1 st line in mild COPD.				
	Ipratropium ATROVENT 20mcg MDI; 250, 500 mcg/2mL nebs; inhalation soln (for dilution)	HFA: 40mcg (2 puffs) inhaled TID-QID [16 puffs/day] Neb: 500mcg (1 neb) inhaled TID-QID [2000mcg]	<ul style="list-style-type: none"> Improves COPD symptoms; does not reduce exacerbations. Onset <20 min. AE: similar to LAMA; ↓ incidence of dry mouth vs tiotropium (less potent). Avoid eye contact (can precipitate acute glaucoma) - especially with nebs. 	\$ 33 \$ 195	
	Long-Acting Muscarinic Antagonist (LAMA): slow to dissociate from pulmonary M ₃ receptors = long-lasting ↓ in smooth muscle contraction. For mod-sev COPD, or after SABA +/- SAMA failure.				
	Tiotropium SPIRIVA 18mcg cap ☹ ☹; 2.5mcg soft mist X ☹	HandiHaler: 18mcg (1 cap) inhaled once daily SWALLOW ^{UPLIFT} Respimat: 5mcg (2 puffs) inhaled once daily	<ul style="list-style-type: none"> Tiotropium: may ↓ COPD exacerbations by 20-30%/yr. Other LAMAs: limited data but appear similar. {Respimat: ↑ bioavailability, previous CV concerns} AE: dry mouth, cough, constipation, urinary retention, headache. Avoid eye contact. Rinse mouth after inhalation to ↓ dry mouth AE. 	\$ 87 \$ 87	
	Acclidinium TUDORZA 400mcg DPI ☹ ☹	Genuair: 400mcg (1 puff) inhaled BID	<ul style="list-style-type: none"> AE: dry mouth, cough, constipation, urinary retention, headache. Avoid eye contact. Rinse mouth after inhalation to ↓ dry mouth AE. 	\$ 73	
	Glycopyrronium SEEBRI 50mcg cap ☹ ☹	Breezhaler: 50mcg (1 cap) inhaled once daily SWALLOW ^{GLOW}	<ul style="list-style-type: none"> Glycopyrronium < dry mouth vs tiotropium, but URTI and UTI. Tiotropium, glycopyrronium: ☹ may accumulate in renal impairment; clinical significance unknown. Acclidinium, umeclidinium: <u>not</u> renally eliminated. Fastest onset: glycopyrronium (<15 min). 	\$ 73	
Umeclidinium INCRUSE 62.5mcg DPI X ☹	Ellipta: 62.5mcg (1 puff) inhaled once daily		\$ 81		
Sympathomimetics	Short-Acting Beta₂-Agonist (SABA): binds to β ₂ pulmonary receptors, which ↑ cAMP; cAMP responsible for the relaxation of bronchial smooth muscle. 1 st line in mild COPD.				
	Salbutamol VENTOLIN, g 100mcg MDI; 200mcg DPI X ☹; 1.25, 2.5, & 5 mg/2.5mL nebs; inhal'n soln	HFA: 100-200mcg (1-2 puffs) inhaled QID prn [1200mcg] Diskus: 200mcg (1 puff) inhaled QID prn [1600mcg] Neb: 2.5mg inhaled QID prn [15mg]	<ul style="list-style-type: none"> Improves COPD symptoms; does not reduce exacerbations. Useful as "rescue" therapy due to short onset (salbutamol <5 min; faster than SAMA). AE: tremor, ↑ nervousness, ↑ HR (esp. neb), ↑QT, headache. At high doses: ↓ K⁺, ↑ insulin secretion 	\$ 17 \$ 38 \$ 107	
	Terbutaline BRICANYL 500mcg DPI	Turbuhaler: 500mcg (1 puff) inhaled QID prn [4000mcg]		\$ 20	
	Long-Acting Beta₂-Agonist (LABA): slow to dissociate from pulmonary β ₂ receptors, resulting in long-lasting bronchodilation. For mod-severe COPD, or use after SABA +/- SAMA failure.				
	Formoterol FORADIL, OXEZE 12mcg caps ☹ ☹; 6mcg, 12mcg DPI ☹ ☹	Aerolizer: 12mcg (1 cap) inhaled BID SWALLOW Turbuhaler: 6-12mcg inhaled BID [72mcg]	<ul style="list-style-type: none"> LAMA vs LABA: both first line COPD therapy. Tiotropium shown to have greater reduction in exacerbations than salmeterol ^{POET}; unclear whether this is a class effect. LAMAs may ↑ tolerability vs LABAs (less discontinuation). 	\$ 69 \$ 63	
	Salmeterol SEREVENT 50mcg DPI ☹ ☹	Diskus: 50mcg (1 puff) inhaled BID	<ul style="list-style-type: none"> AE: tremor, ↑ HR. Similar AE to SABAs, but less substantial. Indacaterol: 18% incidence of cough following inhalation ^{INLIGHT}; may lessen after 1 week. Fastest onset: indacaterol, formoterol, olodaterol, and vilanterol (<5 min). Higher indacaterol doses (150, 300mcg) approved in Europe; not available in North America due to the potential for cardiovascular risk. 	\$ 77	
Indacaterol ONBREZ 75mcg cap ☹ ☹	Breezhaler: 75mcg (1 cap) inhaled once daily SWALLOW		\$ 65		
Olodaterol STRIVERDI 2.5mcg soft mist X ☹	Respimat: 5mcg (2 puffs) inhaled once daily		not set		
Combinations	SAMA + SABA combination: useful as prn therapy in any stage of COPD, and as treatment for acute exacerbations of COPD.				
	Ipratropium + Salbutamol COMBIVENT 0.5+2.5mg/2mL nebs; 20+100mcg soft mist	Respimat: 20/100mcg (1 puff) inhaled QID prn [6 puffs] Neb: 0.5/2.5mg (1 neb) inhaled QID prn [4 nebs]	<ul style="list-style-type: none"> In AECOPD: use high dose; may continue long-acting agents; limited evidence for combination over a single agent (but commonly used) 	\$ 44 \$ 113	
	LAMA + LABA combination: decreased cost and increased convenience vs using a LAMA + LABA in separate inhalers (but drug coverage for combo products varies)				
	Acclidinium + Formoterol DUAKLIR 400+12mcg DPI X ☹	Genuair: 400/12mcg (1 puff) inhaled twice daily	<ul style="list-style-type: none"> Data for dual therapy is limited, but evidence suggests a statistically significant, although not clinically significant, ↑ in quality of life & lung function. ^{SPARK} Dual therapy is reasonable in patients poorly controlled on monotherapy. 	\$ 98	
	Glycopyrronium + Indacaterol ULTIBRO 50+110mcg DPI ☹ ☹	Breezhaler: 50/110mcg (1 cap) inhaled once daily SWALLOW		\$ 105	
	Tiotropium + Olodaterol INSPIOLTO 2.5+2.5mcg soft mist X ☹	Respimat: 5/5mcg (2 puffs) inhaled once daily		\$ 85	
	Umeclidinium + Vilanterol ANORO 62.5+25mcg DPI ☹ ☹	Ellipta: 62.5/25mcg (1 puff) inhaled once daily		\$ 107	
	LABA + Inhaled Corticosteroid (ICS) combination: addition of ICS further ↓ exacerbations vs LABA alone; useful in severe COPD if frequent exacerbations; withdrawal of ICS an option in some ^{WISDOM}				
Formoterol + Budesonide SYMBICORT 6+100, 6+200 mcg DPI ☹ ☹	Turbuhaler: 12/400mcg (2 puffs) inhaled BID [24/800mcg]	<ul style="list-style-type: none"> Choose LAMA over LABA+ICS: same ↓ in exacerbations, less AE & cost ^{INSPIRE} (Guideline-directed & evidence to support, but some ambiguity in the evidence). Triple therapy (LAMA + LABA + ICS) is rational, but evidence is limited: may not ↓ exacerbations vs LAMA, but may ↑ quality of life & lung function 	\$ 110		
Formoterol + Mometasone ZENHALE 5+100, 5+200 mcg DPI X ☹ (EDS asthma)	HFA: 10/200mcg (2 puffs) inhaled BID Not officially approved for COPD	<ul style="list-style-type: none"> Avoid ICS monotherapy: increases mortality ^{TORCH} NNH = 87/yr vs LABA+ICS AE: thrush 5% & hoarseness 5% (dose related: rinse mouth [swish & spit] after use; add a spacer when using an MDI), ↑ risk of pneumonia [NNH = 16 over 3 years vs LABA], may ↑ osteoporosis/fractures (conflicting evidence). 	\$ 116		
Salmeterol + Fluticasone ^{propionate} ADVAIR 50+100, 50+250, 50+500 mcg DPI ☹ ☹	Diskus: 50/250mcg (1 puff) inhaled BID [100/1000mcg] (ADVAIR HFA 25+125, 25+250mcg <u>not officially COPD approval</u>)		\$ 126 \$ 175		
Vilanterol + Fluticasone ^{furoate} BREO 25+100mcg DPI ☹ ☹	Ellipta: 25/100mcg (1 puff) inhaled once daily ^{SUMMIT}	<ul style="list-style-type: none"> BREO: fluticasone ^{furoate} - more potent/longer lasting vs fluticasone ^{propionate} 	\$ 153		
Other	Roflumilast DAXAS 500mcg tab X ☹	500mcg po once daily	AE: diarrhea, nausea, HA, abd pain, ↓wt. Rare: depression/suicide, ↑AST ^D ^{3A4,1A2} ; CBZ, phenobarb, phenytoin	\$ 85	
	Theophylline LA, SR, UNIPHYL 100, 200, 300, (400 ^s , 600 ^{mg}) ^{UNIPHYL} SR tabs	200-400mg SR po daily	Infrequently used due to AE/toxicity/DI. AE: ↑ HR, nausea, tremor M: HR, CNS effects (insomnia, irritability), serum levels (<83 μmol/L)	DI CYP 3A4,1A2: ↓theo: CBZ, phenytoin, rifampin, smoking ↑theo: allopurinol, cimetidine, ciprofloxacin, erythromycin, febuxostat, fluvoxamine, norfloxacin, verapamil.	\$ 15 - 24

☹=Do not =EDS X=Non Formulary Sask ☹=prior approval NIHB ☹=not covered by NIHB AECOPD=acute exacerbation of COPD CNS=central nervous system COPD=chronic obstructive pulmonary disease DPI=dry powder inhaler FEV₁=forced expiratory volume in 1 second HA=headache HR=heart rate HFA=hydrofluoroalkane inhal'n soln=inhalation solution MDI=metered dose inhaler URTI=upper respiratory tract infection UTI=urinary tract infection PDE=phosphodiesterase

There is no evidence to suggest one device works better than another. Poor inhaler technique: ↓ efficacy. Pt device dissatisfaction: ↓ adherence. Choose device based on pros/cons below & patient preference.

DEVICE	MDI	Respimat	HandiHaler, Breezhaler	Turbuhaler	Diskus	Genuair	Ellipta
	beclomethasone QVAR ciclesonide ALVESCO fluticasone FLOVENT formoterol/mometasone ZENHALE salmeterol/fluticasone ADVAIR ipratropium ATROVENT salbutamol VENTOLIN	olodaterol STRIVERDI salbutamol/ipratropium COMBIVENT tiotropium SPIRIVA tiotropium/olodaterol INSPIOLTO	HandiHaler: tiotropium SPIRIVA Breezhaler: glycopyrronium SEEBRI glycopyrronium/indacaterol ULTIBRO indacaterol ONBREZ	formoterol OXEZE formoterol/budesonide SYMBICORT terbutaline BRICANYL	salbutamol VENTOLIN salmeterol SEREVENT salmeterol/fluticasone ADVAIR	acclidinium TUDORZA acclidinium/formoterol DUAKLIR	umeclidinium INCRUSE vilanterol/fluticasone BREO vilanterol/umeclidinium ANORO
Description	Delivers aerosolized stream of medication over ~0.2 seconds.	Uses a spring to deliver a "soft mist" of medication over ~1.5 seconds.	Capsules containing medication are pierced, then powder inside is inhaled.	Dry powder inhaler containing a reservoir of medication.	Dry powder inhaler containing single dose blisters of medication.		
Pros	Low inspiratory flow ≈ 20L/min required		Breath-actuated: reduces need for hand-breath coordination				
	<ul style="list-style-type: none"> Suitable for all ages. Note: spacer strongly recommended regardless of age (see comments below). Spacer with a mask available for cognitive impairment, frail, < 5 years old, etc. Can be used with mechanical ventilation (e.g. in critical care units) 	<ul style="list-style-type: none"> Slower actuation may improve technique vs MDI DOSE COUNTER: numbered by interval (frequency of interval varies by medication); loading base locks to signal empty COMBIVENT Respimat has cost advantage over COMBIVENT nebulers. INSPIOLTO Respimat has cost advantage over other LAMA/LABA combos. <p>Note: Pharmacies should pre-load the Respimat canister before dispensing</p>	<ul style="list-style-type: none"> Rattling or whirring heard if capsule's contents inhaled correctly. Can look to view empty capsules (and Breezhaler has clear capsules). Low inspiratory effort needed DOSE COUNTER: each capsule equals 1 dose; thus no dose counter required 	<ul style="list-style-type: none"> Few steps, easy to use (compared to HandiHaler or Breezhaler). Dose is not lost even if base is twisted multiple times; however dose counter will no longer be accurate DOSE COUNTER: every 20th dose numbered to give approximation of doses remaining 	<ul style="list-style-type: none"> DOSE COUNTER: displays exact number of remaining doses 	<ul style="list-style-type: none"> Simple to use & less errors during dose preparation vs HandiHaler Provides visual (window changes green → red) & audible ("click") feedback when dose taken correctly In one study, majority of patients (80%) preferred Genuair over HandiHaler. DOSE COUNTER: every 10th dose numbered; loading button locks to signal empty 	<ul style="list-style-type: none"> Simple to use; one step to open & load dose. Sub-analysis of RCT data: 95% of asthmatics able to use correctly after only one demonstration In one study, majority of patients (>60%) preferred Ellipta over MDI, Diskus, or HandiHaler. DOSE COUNTER: displays exact number of remaining doses with large numbers
Cons	<ul style="list-style-type: none"> DOSE COUNTER: most devices lack dose counter (exceptions: ADVAIR, ZENHALE) Spacer can be cumbersome; however, if using only at home in the morning/evening, additional burden is low. Susceptible to freezing Requires priming (x 4 sprays) if not used for ≥ 5 days 	<ul style="list-style-type: none"> Requires reasonable strength to spring-load dose Incorrect rate of inhalation results in cough Not approved for kids or for use with a spacer New device to the market - limited real-world experience Requires priming (until mist is visible, then 3 more sprays) if first time use OR if not used for ≥ 21 days. Requires priming (x 1 spray) if not used for ≥ 3 days. 	<ul style="list-style-type: none"> Multi-step process: may be difficult to use for patients with poor manual dexterity (eg: arthritic hands, Parkinson's disease) or cognitive impairment Capsules are packaged in foil blisters; may be difficult to remove (for some) and are light and moisture sensitive Patients have been known to swallow capsules instead of inhaling them. Pieces of capsule may be inhaled if pierced more than once. 	<ul style="list-style-type: none"> When empty, remaining desiccant can still be heard - patients may think there are doses left DOSE COUNTER: displays a "zero", but it can be difficult to tell when the indicator reaches this mark Humidity/moisture (e.g. exhaling into device, storing in bathroom) can clump drug in reservoir 	<ul style="list-style-type: none"> Short expiry date after removal from protective packaging: ADVAIR = 1 month; SEREVENT = 6 weeks - Exception: VENTOLIN = 1 year Medications for Diskus inhalers tend to be among the most expensive in their class 	<ul style="list-style-type: none"> Some patients may experience a bitter taste with acclidinium New device to the market - limited real-world experience. 	<ul style="list-style-type: none"> No way to identify if proper inspiratory effort is being achieved Short expiry date (6 weeks) after removal from protective packaging
	<ul style="list-style-type: none"> Requires sharp, forceful inhalation of breath to get full dose - some patients (e.g. < 5 years old, some COPD patients with severe symptoms) will be unable to achieve adequate flow rate. 						

COPD=chronic obstructive pulmonary disease MDI=metered dose inhaler RCT=randomized controlled trial

More inhalation devices listed & compared at www.rxfiles.ca

- Use a spacer with an MDI:** ↑ drug delivery to lungs; ↓ need for hand-breath coordination; ↓ systemic absorption; ↓ local adverse effects e.g. hoarseness & thrush with corticosteroids, dry mouth with anticholinergics.
- If on more than one inhaler:** (1) consider using the same device for all medications; (2) use the bronchodilator first & the anti-inflammatory last; (3) wait ~5 minutes between puffs of different medications.
- Nebulizer/compressor solution:** (available for budesonide, ipratropium, salbutamol, and salbutamol/ipratropium) **expensive without added benefit versus spacer** except possibly in **very young & very old**, drug entering room air may ↑ infection transmission, time consuming, & can affect eyes. Useful during exacerbations for patients in too much distress to use proper inhaler technique, but spacer preferred.
- General inhaler technique:** (1) prepare dose, (2) breathe out, (3) inhale medication, (4) hold 10 seconds, (5) breathe out. (See [RxFiles Inhaler Technique](#).) May take a **second breath** from dry powder devices to ensure the entire dose is inhaled. Rinsing mouth (and spitting) after anticholinergics and corticosteroids decreases side effects. Best to wait ~1 minute between puffs of the same medication.