













# **ASTHMA & COPD: Inhalation Devices Chart**

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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.** For many patients, **dry powder inhalers are preferred**, as these feature a **DOSE COUNTER** (limits risk of accidentally using an empty inhaler),<sup>27</sup> do not require a spacer, and limit environmental impact.<sup>26</sup>

Drug	beclo-methasone <b>QVAR</b> ciclesonide <b>ALVESCO</b> fluticasone <b>FLOVENT</b> ipratropium <b>ATROVENT</b> momet./form. <b>ZENHALE</b> flutic./salmeter. <b>ADVAIR</b> salbutamol <b>VENTOLIN</b> bud./form./glyc. <b>BREZTRI</b> 	olodaterol <b>STRIVERDI</b> salbut./ipra. <b>COMBIVENT</b> tiotropium <b>SPIRIVA</b> tio./olodater. <b>INSPIOLTO</b> 	<b>HandiHaler:</b> tiotropium <b>SPIRIVA</b> <b>Breezhaler:</b> glycopyrronium <b>SEEBRI</b> glycopyrr./indacat. <b>ULTIBRO</b> indacaterol <b>ONBREZ</b> indacat./mometasone <b>ATECTURA</b> glycopyrr./indacat./momet. <b>ENERZAIR</b>  <b>Aerolizer:</b> formoterol <b>FORADIL</b> → 	budesonide <b>PULMICORT</b> formoterol <b>OXEZE</b> bud./form. <b>SYMBICORT</b> terbutaline <b>BRICANYL</b> 	fluticasone propionate <b>AERMONY</b> salmeterol/fluticasone <b>ARBESDA</b> 	mometasone <b>ASMANEX</b> 	<b>Diskus:</b> fluticasone <b>FLOVENT</b> salbutamol <b>VENTOLIN</b> salmeterol <b>SEREVENT</b> salmeterol/fluticasone <b>ADVAIR</b>  <b>Inhub:</b> salmeterol/fluticasone <b>WIXELA</b> → 	acclidinium <b>TUDORZA</b> acclidinium/formoterol <b>DUAKLIR</b> 	flutic. furoate <b>ARNUITY</b> flutic./vilanterol <b>BREO</b> umeclidinium <b>INCROUTE</b> umec./vilant. <b>ANORO</b> flutic./vilant./umec. <b>TRELEGY</b> 
DEVICE	MDI	Respi-mat	HandiHaler, Breezhaler, Aerolizer	Turbuhaler	RespiClick	Twisthaler	Diskus, Inhub	Genuair	Ellipta
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"><li>• Suitable for <b>all ages</b>. Note: <b>spacer</b> (\$20-\$60) recommended regardless of age (see comments below). </li><li>• <b>Spacer with a mask</b> available for cognitive impairment, frail, &lt; 5yrs old, etc.</li><li>• Can be used with mechanical ventilation (e.g. in critical care units)</li></ul>	<ul style="list-style-type: none"><li>• Slower actuation may improve technique vs MDI.</li><li>• <b>DOSE COUNTER:</b> numbered by interval (frequency of interval varies by agent); loading base <b>locks</b> to signal empty</li><li>• <b>COMBIVENT Respi-mat</b> has cost advantage over <b>COMBIVENT nebulus</b>.</li></ul> <p><b>Note:</b> Pharmacies should pre-load <b>Respi-mat</b> canisters before dispensing</p>	<ul style="list-style-type: none"><li>• Rattling or whirring heard if capsule's contents inhaled correctly. Can look to view empty capsules (and <b>Breezhaler</b> has clear capsules).</li><li>• Low inspiratory effort needed</li><li>• <b>DOSE COUNTER:</b> each capsule equals 1 dose; thus no dose counter required</li></ul>	<ul style="list-style-type: none"><li>• Dose is not lost even if base is twisted multiple times; however, dose counter will no longer be accurate.</li><li>• <b>DOSE COUNTER:</b> every 20<sup>th</sup> dose numbered to give approximation of doses remaining. <b>BRICANYL</b> and <b>PULMICORT:</b> red mark indicating 'empty' can easily be missed (pts could keep using empty inhaler).</li></ul>	<ul style="list-style-type: none"><li>• <b>One step</b> to open &amp; load dose.</li><li>• <b>DOSE COUNTER:</b> every 2<sup>nd</sup> dose numbered. Dose counter changes to <b>red</b> when last 20 doses are remaining.</li><li>• High rate of correct use after one instruction.<sup>29</sup></li></ul>	<ul style="list-style-type: none"><li>• <b>One step</b> to open &amp; load dose.</li><li>• <b>DOSE COUNTER:</b> displays exact number of remaining doses. Device <b>locks</b> when empty.</li></ul>	<ul style="list-style-type: none"><li>• <b>DOSE COUNTER:</b> displays exact number of remaining doses</li></ul>	<ul style="list-style-type: none"><li>• <b>One button press</b> to load dose.</li><li>• Provides <u>visual</u> (window changes <b>green</b> → <b>red</b>) &amp; <u>audible</u> ("click") feedback when dose taken correctly</li><li>• In one study, majority of patients (80%) preferred <b>Genuair</b> over <b>HandiHaler</b>.<sup>24</sup></li><li>• <b>DOSE COUNTER:</b> every 10<sup>th</sup> dose numbered; loading button <b>locks</b> to signal empty</li></ul>	<ul style="list-style-type: none"><li>• <b>One step</b> to open &amp; load dose. Up to 95% of asthmatics able to use correctly after only one demonstration.<sup>23</sup></li><li>• In one study, majority of patients (&gt;60%) preferred <b>Ellipta</b> over <b>MDI</b>, <b>Diskus</b>, <b>HandiHaler</b>.<sup>22</sup></li><li>• <b>DOSE COUNTER:</b> displays exact number of remaining doses with <b>large</b> numbers</li></ul>
Cons									
	<ul style="list-style-type: none"><li>• <b>DOSE COUNTER:</b> most devices lack dose counter (exceptions: <b>ADVAIR</b>, <b>ZENHALE</b>)</li><li>• Spacer can be cumbersome; however, if using only at home in the morning/evening, burden is low.</li><li>• Susceptible to freezing</li><li>• Requires priming (will waste some doses).</li><li>• Contains greenhouse gases.<sup>26</sup></li></ul>	<ul style="list-style-type: none"><li>• Requires reasonable strength to spring-load dose</li><li>• Incorrect rate of inhalation may result in cough</li><li>• <b>Not approved for kids</b>.</li><li>• Requires priming (will waste some doses).</li></ul>	<ul style="list-style-type: none"><li>• <b>Multi-step process:</b> may be difficult to use for patients with poor manual dexterity (eg: arthritic hands, Parkinson's disease) or cognitive impairment</li><li>• Capsules are packaged in foil blisters; may be difficult to remove (for some) and are light and moisture sensitive</li><li>• Patients have been known to swallow capsules instead of inhaling them.</li><li>• Pieces of capsule may be inhaled if pierced more than once.</li></ul>	<ul style="list-style-type: none"><li>• <b>Requires sharp, forceful inhalation of breath to get full dose</b> - some patients (e.g. &lt; 5 years old, or some COPD patients with severe symptoms) will be unable to achieve adequate flow rate. <b>Turbuhaler</b> and <b>Twisthaler</b> devices appear to require high flow rates.<sup>28</sup></li><li>• <b>Tipping device before inhalation (e.g. upside down) can lose the dose</b></li></ul>	<ul style="list-style-type: none"><li>• When empty, remaining desiccant can still be heard - pts may think there are doses left</li><li>• Humidity/moisture (e.g. exhaling into device, storing in bathroom) can clump drug in reservoir</li></ul>	<ul style="list-style-type: none"><li>• Device must be fully opened to load dose (must hear an audible "click")</li></ul>	<ul style="list-style-type: none"><li>• Device must be closed properly to load next dose (must hear an audible "click")</li></ul>	<ul style="list-style-type: none"><li>• Short expiry date after removal from protective packaging for: <b>ADVAIR</b> (1 month), <b>SEREVENT</b> (6 wks), <b>WIXELA</b> (1 month),</li></ul>	<ul style="list-style-type: none"><li>• Some patients may experience a bitter taste with acclidinium</li></ul>

**COPD**=chronic obstructive pulmonary disease **MDI**=metered dose inhaler **RCT**=randomized controlled trial ▼=covered by NIHB

• **Encourage a spacer** ▼ <sup>2y</sup> **with an MDI**: associated with ↑ drug delivery to lungs, ↓ need for hand-breath coordination, ↓ systemic absorption, ↓ adverse effects e.g. hoarseness & thrush with corticosteroids, dry mouth with anticholinergics. Spacers possibly less critical errors than MDI alone.<sup>30</sup> **AEROCHAMBER2GO** \$45 X Ⓢ: small size, but does not fit **AIROMIR**, **QVAR**, or **ALVESCO**. Respi-mat devices typically do NOT need spacers, but **ODAPT soft mist adapter** available.<sup>31</sup>

• **DOSE COUNTERS**: **Potentially crucial**. Reports of patients **using empty MDIs** (note: shake + listen, & water submersion, are not useful in determining if doses are left).<sup>27</sup> Reports of patients **discarding** MDIs as assumed to be empty despite doses still remaining.<sup>32</sup> **In asthma action plans**: often ICS dose needs to temporarily increase; if device does not feature a dose counter, then keeping track of this dose increase becomes very difficult.

• **Nebulizer/compressor solution**: (available for budesonide, ipratropium, salbutamol, and salbutamol/ipratropium) **expensive without added benefit versus spacer** except possibly in **very young** & **very old**, nebulizing drug into 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. **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) ideally, wait a few minutes between puffs of different medications.

• **Milk allergies**: Case reports of allergies from trace milk protein in lactose-containing inhalers. No risk: **BRICANYL** Turbuhaler; **PULMICORT** Turbuhaler; all MDIs; all Respi-mats. Any inhaler is OK in lactose-intolerant pts.