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Right Device for the Right Patient:
The Importance of Device Choice in Personalizing COPD Treatment

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Objectives

- Review goals of COPD treatment and the importance of inhaler device choice
- Discuss characteristics of commonly used delivery devices
- Discuss the importance of training and regular follow-up to ensure proper inhaler use

Overview of COPD

COPD is a heterogenous lung condition characterized by chronic respiratory symptoms due to abnormalities of the airways and/or alveoli that cause persistent, often progressive, airflow obstruction[1]

- The characteristic chronic respiratory symptoms of COPD are dyspnea, cough, sputum production and/or exacerbations[1]
- Mucus hypersecretion may be linked to decline in airflow over time[2]
- Dyspnea is a cardinal symptom of COPD[1] and can lead to self-limitation of activity,[3] which, in turn, can lead to further deconditioning and aggravated dyspnea[4]

1. GOLD. 2026 Report. GOLD website. https://goldcopd.org/2026-gold-report/; 2. Allinson JP et al. *Am J Respir Crit Care Med.* 2016;193:662-672; 3. Apps LD et al. *Int J Chron Obstruct Pulmon Dis*. 2014;9:257-263; 4. O'Donnell DE et al. *Int J Chron Obstruct Pulmon Dis*. 2014;9:577-588.

Approaches to Treatment

Goals of Treatment of Stable COPD According to GOLD

- Relieve symptoms
- Improve exercise tolerance
- Improve health status

→ REDUCE SYMPTOMS

+

- Prevent disease progression
- Prevent and treat exacerbations
- Reduce mortality

→ REDUCE RISK

A key component of COPD treatment is inhaled medication

Rescue and maintenance medications

Proper inhaler technique training is important to help with proper use of inhalers

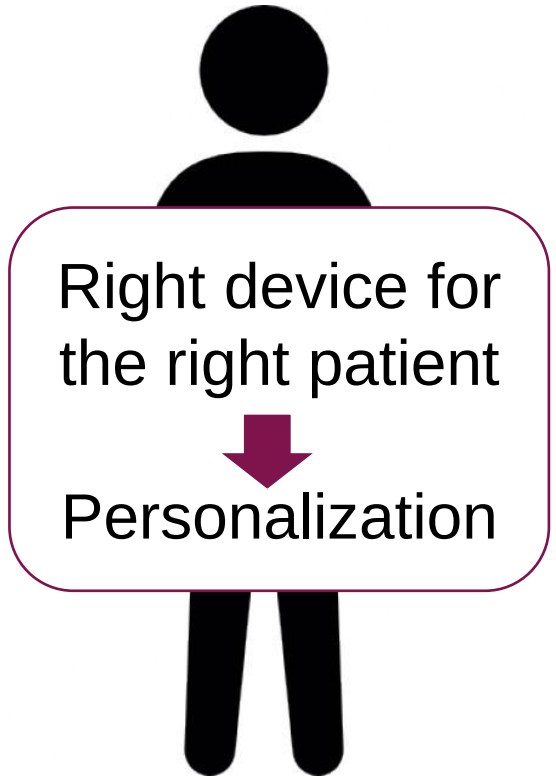
GOLD. 2026 Report. GOLD website. https://goldcopd.org/2026-gold-report/.

Device Choice Is an Important Part of Management

Many pharmacologic choices

Many device types

Specific instructions are available for each type of device



The GOLD report highlights the importance of proper device selection and training by clinicians

- HCPs should identify and gain a working knowledge of inhalation devices
- The choice of inhaler device should be matched to patients' ability and preference
- Patient training is essential
- Inhaler technique should be assessed regularly to help ensure correct device use
- Intervention and coaching can improve patient adherence

GOLD. 2026 Report. GOLD website. https://goldcopd.org/2026-gold-report/.

Consider Differences in Delivery Mechanisms When Choosing an Inhalation Device

Pressurized Metered Dose Inhaler (pMDI)

Dry Powder Inhaler (DPI)

pMDI with spacer

Soft Mist™ Inhaler (SMI)

Nebulizer

Adapted from: National Jewish Health. Devices for inhaled medications (asthma inhalers, COPD inhalers). March 29, 2018. National Jewish Health website. https://www.nationaljewish.org/conditions/medications/asthma-medications/devices

- Randomized controlled trials have not identified superiority of one device or formulation[1]
- A survey of 513 HCPs showed that in newly diagnosed patients only about 1/3 considered the device to be highly important when prescribing medication[2]
- It is important to consider the characteristics of each device when selecting medication(s) for patients with COPD

1. Laube BL et al. *Eur Respir J*. 2011;37:1308-1331; 2. Hanania NA et al. *Chronic Obstr Pulm Dis*. 2018;5:111-123.

Proper Use of a Device Is Critical

"Management of chronic airways disease is 10% medication and 90% education"[1]

- Regardless of inhalation device type, correct use is required for proper delivery[1]
- Observational studies have shown:
  - Errors in device use are common[2,3]
  - Critical errors, which substantially affect dose delivery to the lungs, occurred up to 47% of the time depending on device[2]
  - A significant relationship between improper inhaler use and symptom control in patients with COPD[4]
  - Improper inhaler use has been associated with increased risk of hospitalization and emergency room visits[4]

Inhaler misuse has been associated with[4]:

- Older age
- Lower education level
- Lack of instruction from HCPs

1. Fink JB et al. *Respir Care*. 2005;50:1360-1374; 2. Molimard M et al. *Eur Respir J.* 2017;49:1601794; 3. Vanderman AJ et al. *Consult Pharm*. 2015;30:92-100; 4. Melani AS et al. *Respir Med*. 2011;105:930-938.

Common Technique Errors With pMDIs and DPIs

Patients often report they use good techniques even when error rates are high[1]
Patients may not realize they are committing technique errors[2]

Common errors[3]

DPI

- No full expiration before inhalation
- No post-inhalation breath hold
- Incorrect device preparation
- Speed and/or depth of inhalation (should be *fast* and deep)

pMDI

- No full expiration before inhalation
- No post-inhalation breath hold
- Coordination of actuation and inhalation
- Speed and/or depth of inhalation (should be *slow* and deep)

1. Souza ML et al. *J Bras Pneumol.* 2009;35:824-831; 2. Jahedi L et al. *J Aerosol Med Pulm Drug Deliv*. 2017;30:42-52; 3. Sanchis J et al. *Chest.* 2016;150:394-406.

The Education Gap Around Inhalation Devices

Many patients rely on their primary care physicians for disease education[1]

Healthcare providers may not be proficient in device use[2]

- Physicians and nurses may not receive formal training with inhaler technique, and if trained, may lose proficiency over time[3,4]
- In a survey of pulmonologists and fellows, while they reported knowledge of treatment devices, a minor proportion of respondents reported being very knowledgeable in teaching patients how to use, clean, or maintain the devices[5]
- In a recent survey, 10% of physicians felt fully competent in teaching inhaler use to their patients[2]

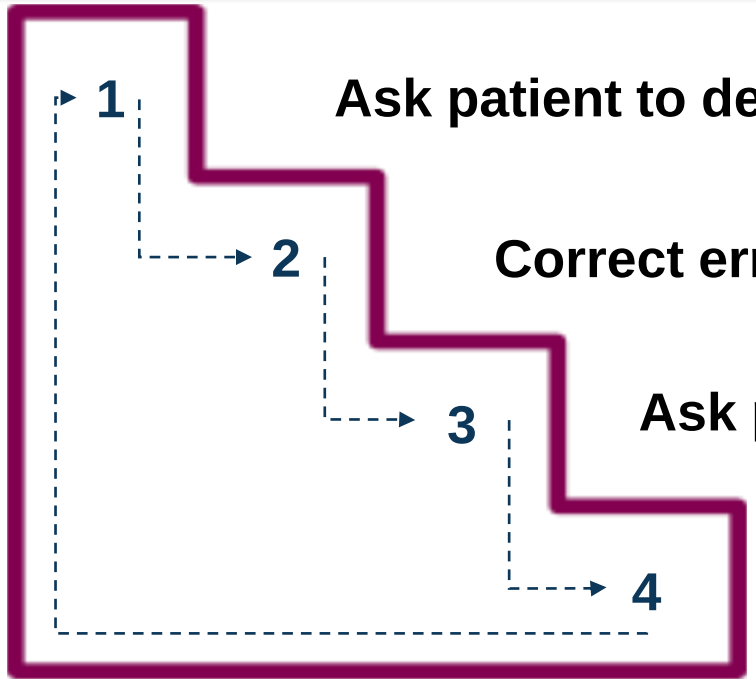
A meta-analysis showed that patients often do not receive any device training or retraining[5,6]

- Lack of training regarding device use has been suggested as the primary reason that patients use their devices incorrectly[6]
- Patients who received training usually received it at initial prescription and did not receive any additional follow-up training or further assessment of inhaler technique[6]

1. Barr RG et al. *Am J Med.* 2005;118:1415; 2. Leung J et al. *Can Respir J*. 2015;22:266-270; 3. Basheti IA et al. *Respir Care.* 2014;59:1716-1725; 4. Resnick DJ et al. *Ann Allergy Asthma Immunol.* 1996;76:145-148; 5. Braman S et al. *Respir Care.* 2018;63:840-848; 6. Chrystyn H et al. *NPJ Prim Care Respir Med.* 2017;27:22.

Training Can Reduce Device Errors

Basics of Effective Training Include:



1. **Ask patient to demonstrate how they use their device**
2. **Correct errors, demonstrating appropriate use if needed**
3. **Ask patient to re-demonstrate incorporating corrections**
4. **Re-check at every patient encounter**

- Technique improved significantly after step-by-step training, tailored to device type
- Face-to-face training improved technique

Pothirat C et al. *Int J Chron Obstruct Pulmon Dis.* 2015;10:1291-1298.

Device Consistency Can Be Helpful for Effective Use[1,2]

- **Operating techniques vary across and within device types**
- **Device consistency between rescue inhaler and maintenance inhaler can be beneficial in patients with COPD or asthma**

1. Bosnic-Anticevich S et al. *Int J Chron Obstruct Pulmon Dis*. 2016;12:59-71; 2. Price D et al. *Allergy Asthma Immunol Res*. 2012;4:184-191.

Choosing a Device: Considerations
Peak Inspiratory Flow

DPIs have different resistances that impact inhalation flow requirements[1,2]

Minimal $PIFR_{resist}$ of a DPI to achieve clinical effect[3]	**PIF ≥30 L/min**
Optimal $PIFR_{resist}$ to generate more particles in respirable range[3]	**PIF ≥60 L/min**

The ability to generate sufficient PIF for effective DPI use may be compromised in some patients with COPD:

- The elderly,[1,2] especially those with short stature, female gender, and lower lung volume[3]
- With increasing disease severity[4]
- Hospitalized for acute exacerbation of COPD[5]

1. Janssens W et al. *Eur Respir J*. 2008;31:78-83; 2. Jarvis S et al. *Age Ageing*. 2007;36:213-218; 3. Mahler DA et al. *J Aerosol Med Pulm Drug Deliv*. 2013;26:174-179; 4. Prime D et al. *J Aerosol Med Pulm Drug Deliv*. 2015;28:486-497; 5. Loh CH et al. *Ann Am Thorac Soc*. 2017;14:1305-1311.

Choosing a Device: Additional Considerations

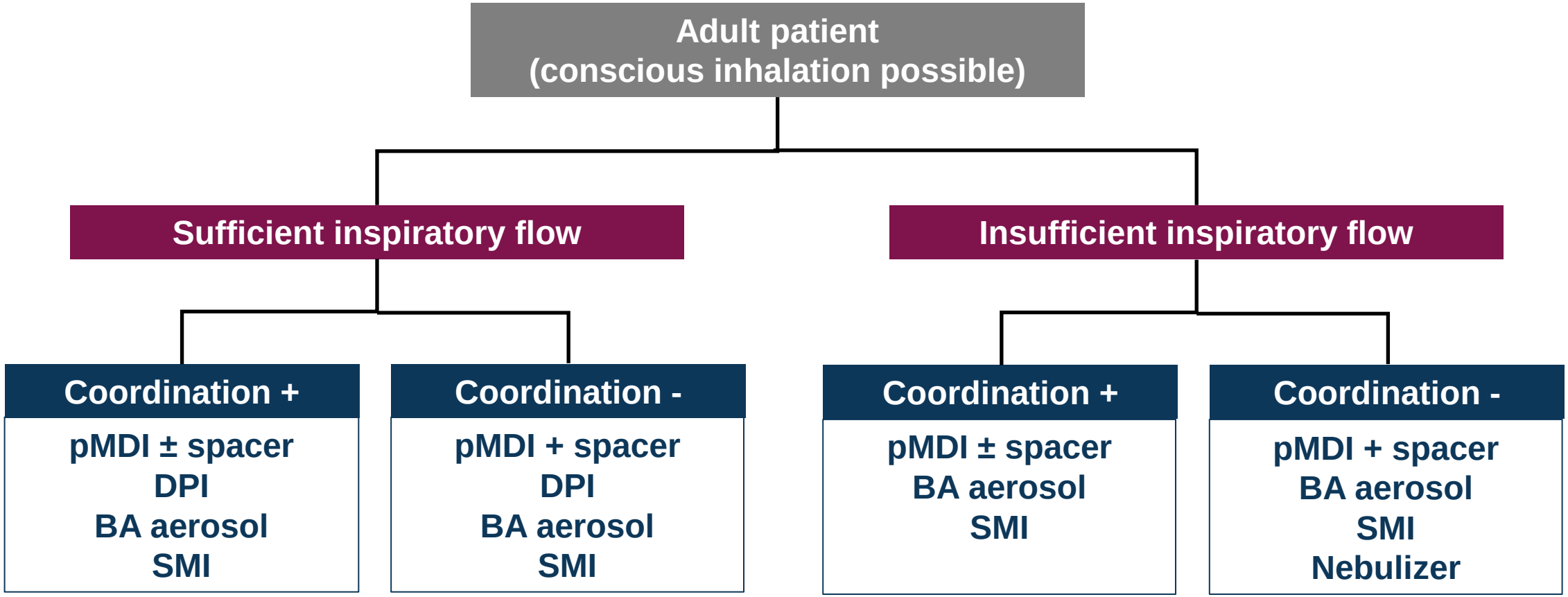
Physical and Cognitive Capabilities

Key Capabilities[1]	Comorbidities that may impact key capabilities[1]
Physical ability to load, prime, and actuate device	• Osteoarthritis and rheumatoid arthritis • Neurologic conditions • Impaired sight or hearing
Cognitive competency	• Dementia/memory impairment • Stroke • Depression

Consider the availability of a reliable caregiver to assist with device setup, administration, cleaning, etc[2]

1. Barrons R et al. *Patient Intell*. 2015;7:53-65; 2. Dhand R et al. *COPD.* 2012;9:58-72.

A Proposed Inhaler Decision Tree*



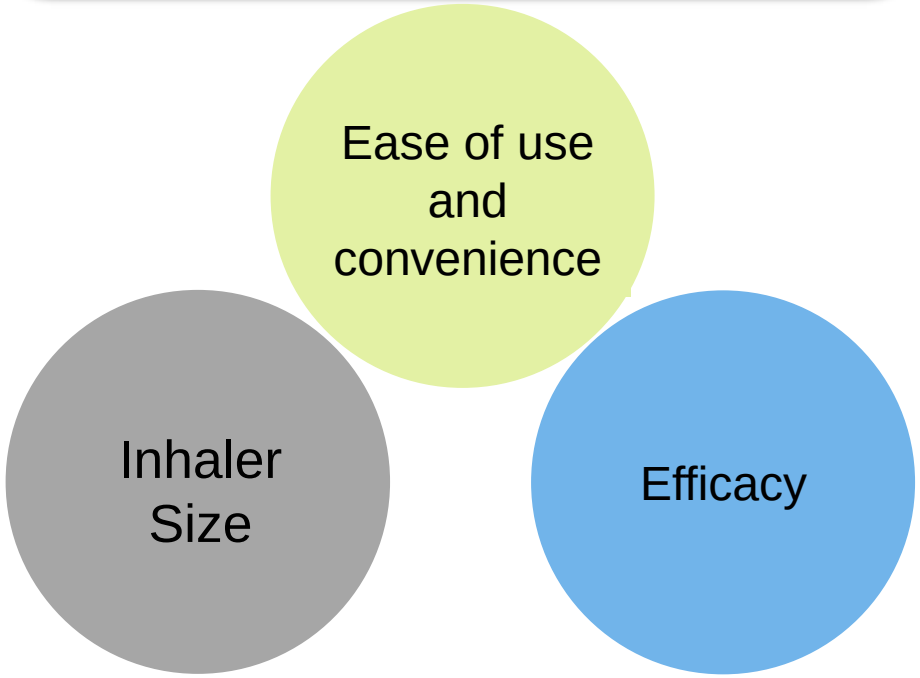
*Treatments are not presented in order of preference.

Dekhuijzen PN et al. *Respir Med*. 2013;107:1817-1821.

Incorporating Patient Preferences into Device Selection

Device preference, familiarity, and satisfaction can have a significant impact on disease management[1]

From a global* survey of device preferences in patients with COPD, the following were most important to the patient[2]



Patient preferences of inhalation devices are not always aligned with physician preferences[3]

*United Kingdom, United States, France, Germany.

1. Virchow JC et al. *J Mark Access Health Policy.* 2015;3:28760; 2. Molimard M et al. *J Aerosol Med Pulm Drug Deliv.* 2015;28:219-228; 3. Roche N et al. *J Aerosol Med Pulm Drug Deliv.* 2017;30:1-13.

Summary Points

- **Device choice is an important part of COPD management and should be individually tailored**
- **It is important to consider the characteristics of each delivery mechanism when choosing a device**
- **Patient factors such as ability and preference can help guide device selection**
- **Errors in device use are common; so training and reassessment of technique is critical**

It is important to provide **the right device for the patient** to optimize the personalization of COPD management

GOLD. 2026 Report. GOLD website. https://goldcopd.org/2026-gold-report/.

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Appendix

Select Characteristics of Commonly Used Delivery Devices

	Advantages	Disadvantages
pMDI	• High reproducibility between doses[1] • Independent of inspiratory flow rate[2] • Option for spacer add-on[1]	• Actuation required (finger/hand strength)[3,4] • Requires coordination of actuation and inhalation[1] • High oropharyngeal deposition[5]
pMDI + spacer	• Can be used in patients who have difficulty performing adequate pMDI technique[6] • Decreased oropharyngeal deposition[5] • Can be used with a facemask[6]	• Subject to static charge[5] • Less portable than pMDI[5] • Use with a facemask reduces lung delivery[6]
DPI	• Have inspiratory flow signals in some devices[7] • Less coordination needed[5] • Breath-actuated[3,4,7-9]	• Requires minimum inspiratory flow for most devices[3,4,7-9] • Loss of dose if patient exhales through device[9] • May be sensitive to moisture and humidity[2,7,9]
SMI	• Independent of inspiratory flow rate[5] • High lung deposition[5] • High fine particle fraction[10]	• May require complex dose loading assembly[2] • Requires press and breathe technique[10] • Not breath-actuated[10]
Nebulizer	• May be used for any age[5] • No specific inhalation technique required[5] • May disperse drugs not available with pMDIs and DPIs[5]	• Treatment times can be long[5] • Performance varies among nebulizers[5] • Less portable than inhalers[3,4,9]

1. Chrystyn H et al. *Prim Care Respir J*. 2009;18:243-249; 2. Bonini M et al. *COPD Res Pract*. 2015;1:9; 3. Dolovich MB et al. *Chest*. 2005;127:335-371; 4. Fromer L et al. *Postgrad Med*. 2010;122:83-93; 5. Lavorini F. *ISRN Allergy*. 2013;2013:102418; 6. Lavorini F et al. *Expert Opin Drug Deliv*. 2009;6:91-102; 7. Barrons R et al. *Am J Health Syst Pharm*. 2011;68:1221-1232; 8. Geller DE. *Respir Care*. 2005;50:1313-1321; 9. Dolovich MB et al. *Lancet*. 2011;377:1032-1045; 10. Newman SP. *Eur Respir Rev*. 2005;14:102-108.