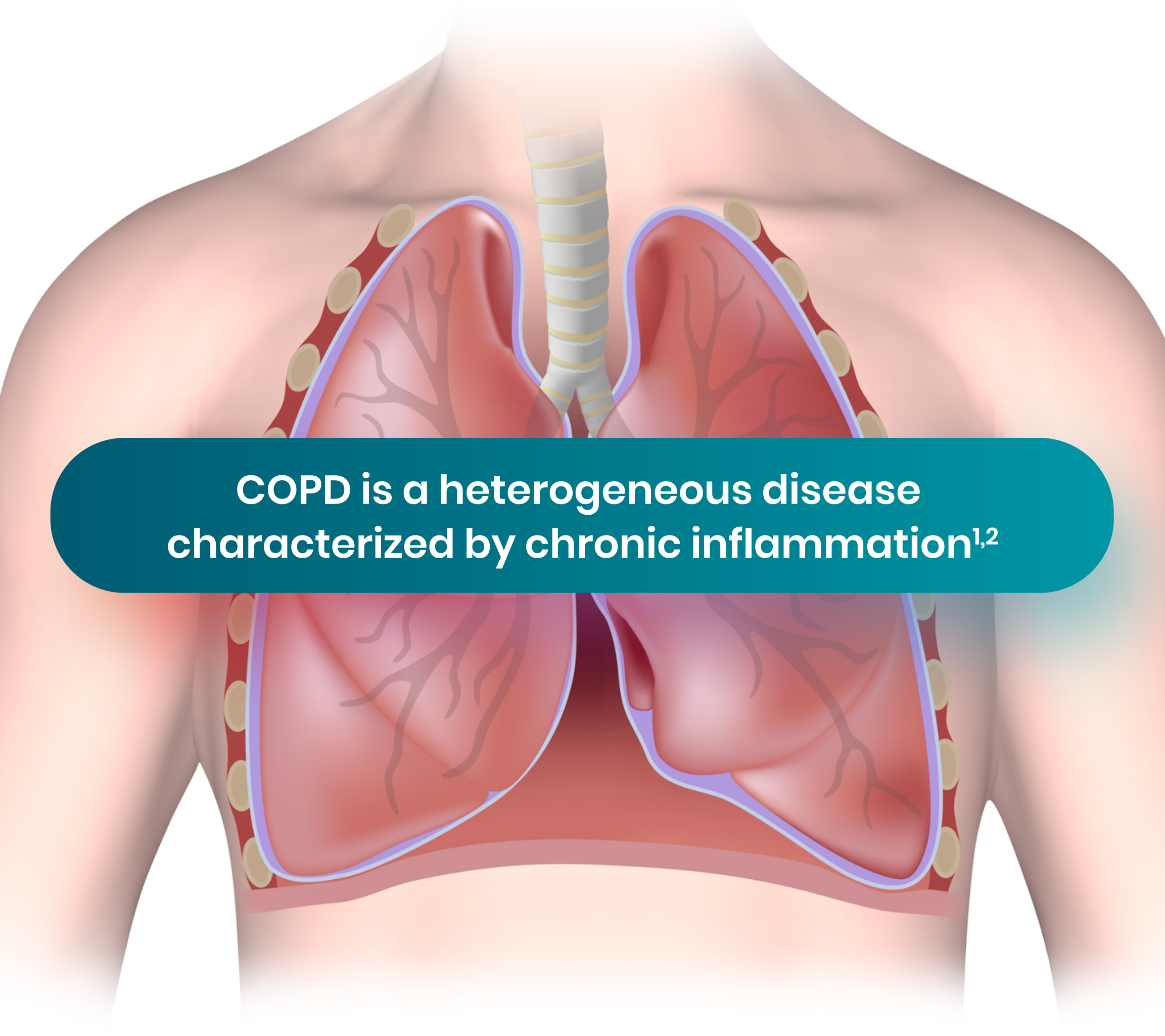


# Chronic Obstructive Pulmonary Disease (COPD): Disease Burden and Heterogeneity

Clinical manifestations of COPD include dyspnea, cough, sputum production, and fatigue among other important symptoms. Patients can experience periods of acute worsening of symptoms known as exacerbations, or “flare-ups”<sup>1,2</sup>



**COPD is a heterogeneous disease characterized by chronic inflammation<sup>1,2</sup>**

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Updated 2023. Accessed March 16, 2023. [https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022\\_WMV.pdf](https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022_WMV.pdf). 2. Lareau S, et al. Am J Respir Crit Care Med. 2018;198:21–22.



# Chronic Obstructive Pulmonary Disease (COPD): Disease Burden and Heterogeneity

COPD is a chronic, heterogeneous, and often progressive inflammatory airway disease that leads to reduced health-related quality of life (HRQoL), diminished exercise capacity, and economic burden<sup>1</sup>



There are multiple risk factors associated with COPD<sup>1-5</sup>



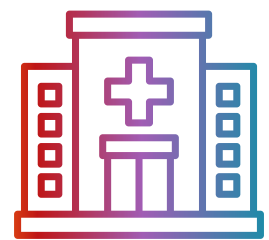
COPD is the 3rd leading cause of death globally, 6th leading cause of death in the United States, and significantly impacts disability-adjusted life-years and quality-adjusted life-years<sup>6-9</sup>



Persistent symptoms of COPD, including breathlessness, cough, and excess sputum, can substantially impact HRQoL<sup>1,10,11</sup>



Exacerbations of COPD contribute to reduced HRQoL, increased risk of rehospitalization and mortality, and substantial economic costs<sup>12-17</sup>



1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Updated 2023. Accessed March 16, 2023. [https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022\\_WMV.pdf](https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022_WMV.pdf). 2. Stolz D, et al. *Lancet*. 2022;400(10356):921-972. 3. Sana A, et al. *BMJ Open Respir Res*. 2018;5(1):e000246. 4. Han MK, et al. *Clin Chest Med*. 2020;41(3):329-337. 5. Campos MA, et al. *Chest*. 2005;128(3):1179-1186. 6. American Lung Association. COPD Trends Brief: Mortality. Accessed April 10, 2023. <https://www.lung.org/research/trends-in-lung-disease/copd-trends-brief/copd-mortality>. 7. GBD 2015 Chronic Respiratory Disease Collaborators. *Lancet Respir Med*. 2017;5(9):691-706. 8. Zafari Z, et al. *Chest*. 2021;159(4):1400-1410. 9. World Health Organization. The top 10 causes of death. Accessed May 2, 2023. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>. 10. Jones PW, et al. *Prim Care Respir J*. 2012;21(3):329-336. 11. Miravittles M, Ribera A. *Respir Res*. 2017;18:67. 12. Seemungal TA, et al. *Am J Respir Critical Care Med*. 1998;157(5 Pt 1):1418-1422. 13. Jones SE, et al. *J Thorac Dis*. 2018;10(Suppl 12):S1390-S1399. 14. Suissa S, et al. *Thorax*. 2012;67(11):957-963. 15. Guarascio AJ, et al. *Clinicoecon Outcomes Res*. 2013;5:235-245. 16. Wacker ME, et al. *Int J Chron Obstruct Pulmon Dis*. 2017;12:3437-3448. 17. Gershon AS, et al. *PLoS One*. 2019;14(5):e0216741.





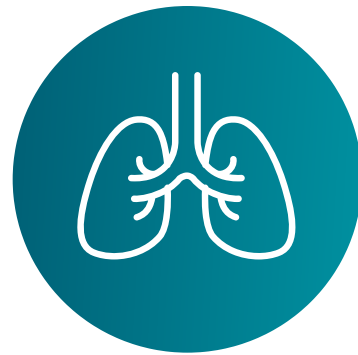
## Established COPD risk factors



**Cigarette smoking<sup>1-4\*</sup>:**  
~70% of cases in high-income countries<sup>1</sup>  
~30%–40% of cases in low- and middle-income countries<sup>1</sup>



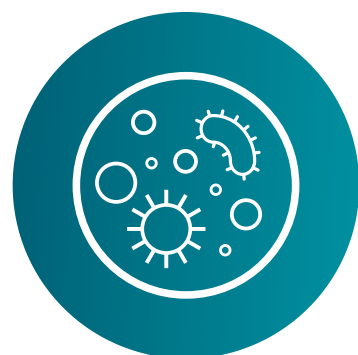
**Fumes and occupational exposure<sup>1-4</sup>**



**Early life factors**, such as childhood asthma,  
preterm birth, low birth weight<sup>1,2,4</sup>



**Genetic factors**, such as *SERPINA1* gene mutations  
that causes alpha-1 antitrypsin deficiency<sup>1,2,4,5</sup>



**Previous infections**, such as infections  
in childhood or tuberculosis<sup>1,2,4</sup>

close

Listed causes are not mutually exclusive.

\*Cigarette smoking is the most commonly encountered risk factor in most countries, whereas risk from fumes and occupational exposure are more prominent factors in developing and underdeveloped countries.<sup>6</sup>

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Updated 2023. Accessed March 16, 2023.

[https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022\\_WMV.pdf](https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022_WMV.pdf). 2. Stolz D, et al. *Lancet*. 2022;400(10356):921-972. 3. Sana A, et al. *BMJ Open Respir Res*. 2018;5(1):e000246. 4. Han MK, et al. *Clin Chest Med*. 2020;41(3):329-337.

5. Campos MA, et al. *Chest*. 2005;128(3):1179-1186. 6. GBD Chronic Respiratory Disease Collaborators. *Lancet Respir Med*. 2020;8(6):585-596.



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**3rd leading cause of death globally<sup>1</sup>**  
**6th leading cause of death in the US<sup>2</sup>**



Over  
**150,000** Americans  
 die of COPD  
 every year<sup>3</sup>



COPD is responsible for  
**1536 DALYs** per **100,000**  
 people in the US<sup>4</sup>

Over the next 20 years,  
 it is projected that COPD  
 will result in  
**~45 million QALYs**  
 lost in the US<sup>5</sup>

close

DALY, disability-adjusted life year; QALY, quality-adjusted life year.

1. World Health Organization. The top 10 causes of death. Accessed May 2, 2023. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>. 2. American Lung Association. COPD Trends Brief: Mortality. Accessed April 10, 2023. <https://www.lung.org/research/trends-in-lung-disease/copd-trends-brief/copd-mortality>. 3. Centers for Disease Control and Prevention. COPD. Accessed April 10, 2023. <https://www.cdc.gov/dotw/copd/index.html#:~:text=COPD%20affects%20more%20than%2015,smoke%20and%20other%20air%20pollutants>. 4. World Health Organization. Global health estimates: Leading causes of DALYs. Accessed April 17, 2023. <https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/global-health-estimates-leading-causes-of-dalys>. 5. Zafari Z, et al. *Chest*. 2021;159(4):1400-1410.



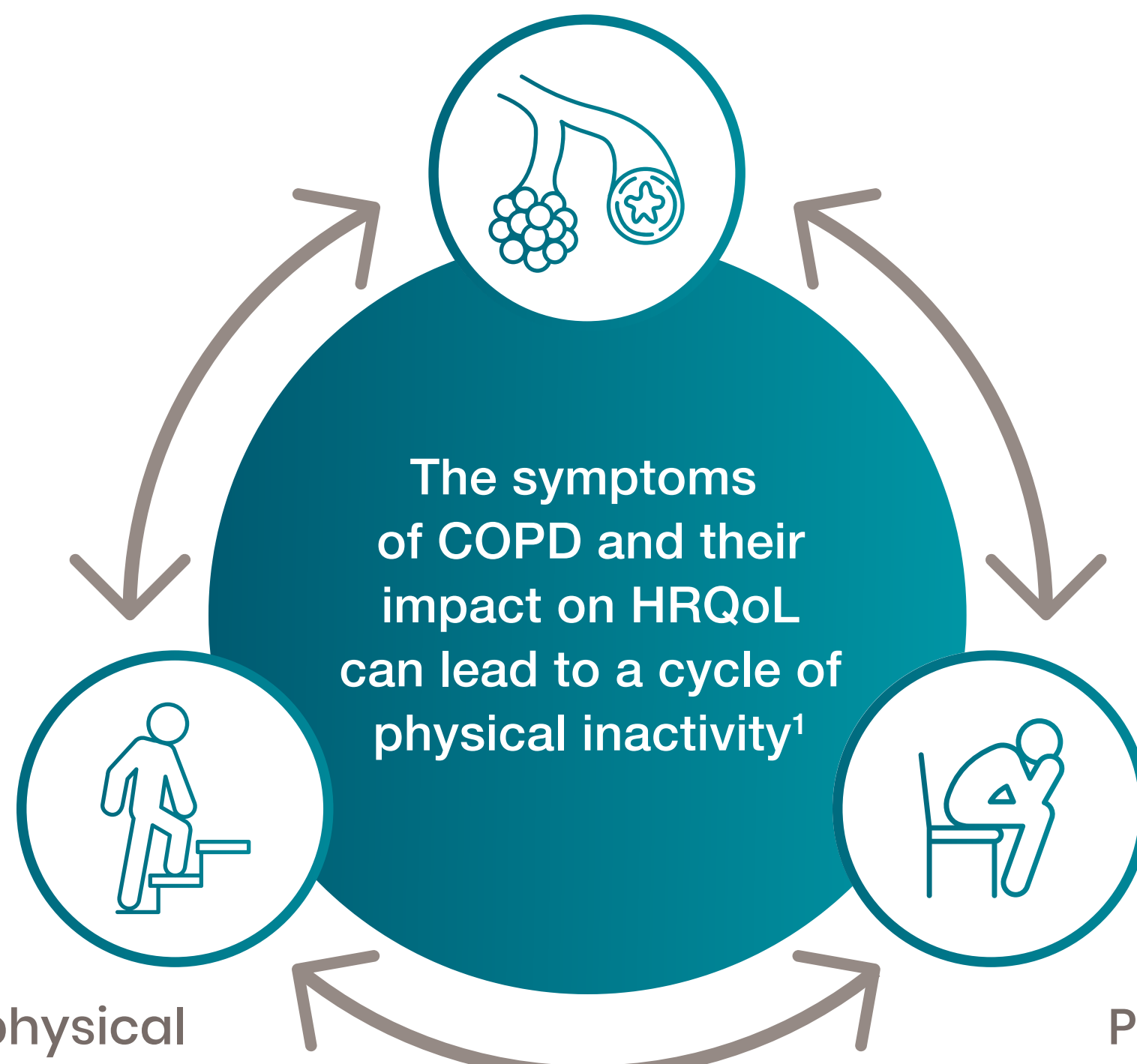
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Persistent symptoms of COPD can impose substantial limitation on physical activity and contribute to worsening shortness of breath and poor HRQoL<sup>1</sup>

Respiratory symptoms  
(breathlessness, cough, and/or excess sputum)<sup>2</sup>



Reduction in physical activity and exercise capacity<sup>1</sup>

Poor HRQoL, mental health, and sleep disturbance<sup>1</sup>

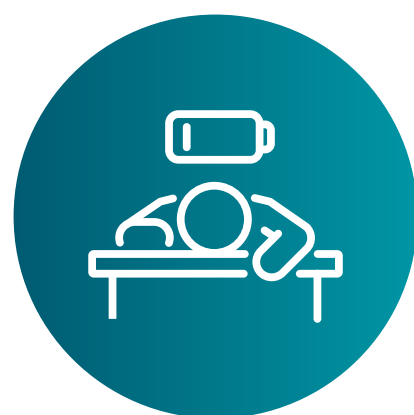
### Symptoms of COPD are associated with:



Poor HRQoL<sup>3</sup>



Reduced exercise capacity<sup>4,5</sup>



Increased fatigue<sup>2</sup>



Higher levels of anxiety and depression<sup>6</sup>



Increased sleep disturbances<sup>6</sup>

close

HRQoL, health-related quality of life.  
1. Miravittles M, Ribera A. *Respir Res*. 2017;18:67. 2. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease. Updated 2023. Accessed March 16, 2023. [https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022\\_WMV.pdf](https://goldcopd.org/wp-content/uploads/2022/12/GOLD-2023-ver-11-2Dec2022_WMV.pdf). 3. Jones PW, et al. *Prim Care Respir J*. 2012;21(3):329-336. 4. Kessler R, et al. *Eur Respir J*. 2011;37(2):264-272. 5. Jones SE, et al. *J Thorac Dis*. 2018;10(Suppl 12):S1390-S1399. 6. Miravittles M, et al. *Respir Res*. 2014;15(1):122.





# Acute exacerbations of COPD



## Negatively impact HRQoL and limit daily activities<sup>1,2</sup>

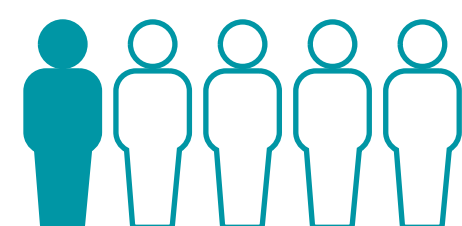
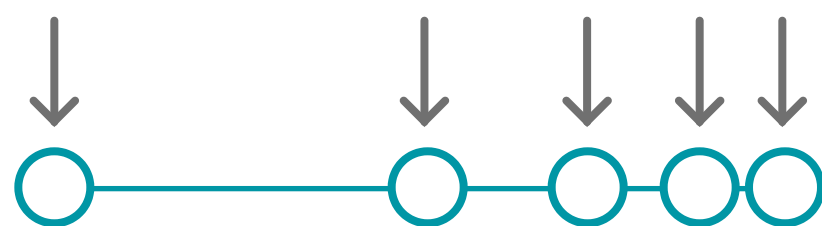
Acute exacerbations had a significant impact on daily living in 86% of patients experiencing  $\geq 2$  exacerbations per year, with about half stopping all activities completely<sup>2,3</sup>



## Increase the risk of future exacerbations requiring hospitalization<sup>4</sup>

Time to next severe exacerbation decreases with every new severe exacerbation<sup>4\*</sup>

Acute exacerbations are associated with an increased risk of hospital readmission<sup>5†</sup>

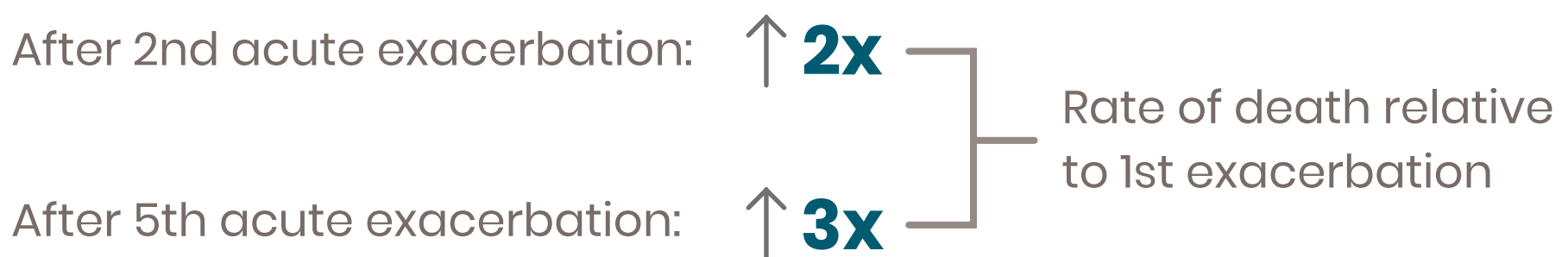


~50% of direct COPD costs are associated with acute exacerbation-related hospitalizations<sup>6,7</sup>



## Major contributor of mortality<sup>4</sup>

**Risk of death increases with each subsequent acute exacerbation<sup>4\*</sup>**



close

HRQoL, health-related quality of life.

\*Patients (mean age=75.4 years) with a first severe exacerbation of COPD requiring hospitalization (N=73,106).

†Patients aged  $\geq 35$  years (N=126,013) with 252,756 index COPD-related hospitalizations.

1. Seemungal TA, et al. *Am J Respir Critical Care Med.* 1998;157(5 Pt 1):1418-1422. 2. Jones SE, et al. *J Thorac Dis.* 2018;10(Suppl 12):S1390-S1399. 3. Kessler R, et al. *Chest.* 2006;130(1):133-142. 4. Suissa S, et al. *Thorax.* 2012;67(11):957-963. 5. Gershon AS, et al. *PLoS One.* 2019;14(5):e0216741. 6. Guarascio AJ, et al. *Clinicoecon Outcomes Res.* 2013;5:235-245. 7. Wacker ME, et al. *Int J Chron Obstruct Pulmon Dis.* 2017;12:3437-3448.

