GOLD 2026 and Korean COPD Guidelines: Key Updates and Clinical Implications

2026.2.21

양산부산대학교병원
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Outline of the Guideline

2026 GOLD

1. Definition and Overview
2. Diagnosis and Assessment
3. Prevention and Management of COPD
4. Management of Exacerbations
5. COPD and Comorbidities
6. Artificial Intelligence and Emerging Technologies in COPD

2024 COPD진료지침

1단원. 정의, 역학, 원인, 기전

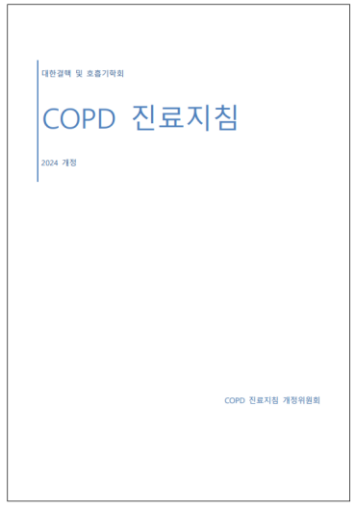
2단원. 진단 및 평가

3단원. 약물 치료

4단원. 비약물 치료

5단원. 급성악화

6단원. 동반질환



Contents

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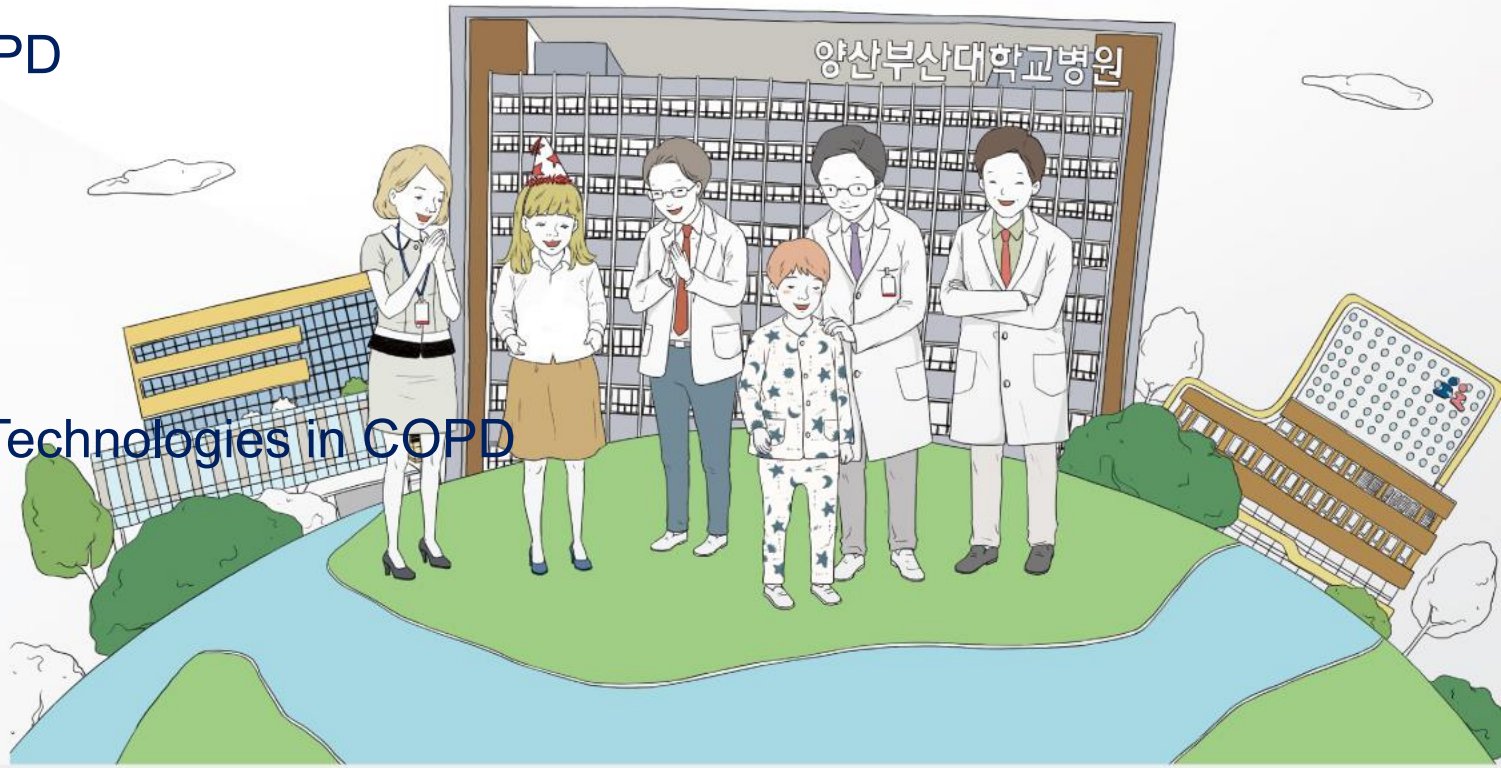

Contents

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COPD Definition

2026 GOLD

- Chronic Obstructive Pulmonary Disease (COPD) is a **heterogeneous** lung condition characterized by chronic respiratory symptoms (dyspnea, cough, sputum production and/or exacerbations) due to abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli (emphysema) that cause persistent, often progressive, airflow obstruction

2024 진료지침

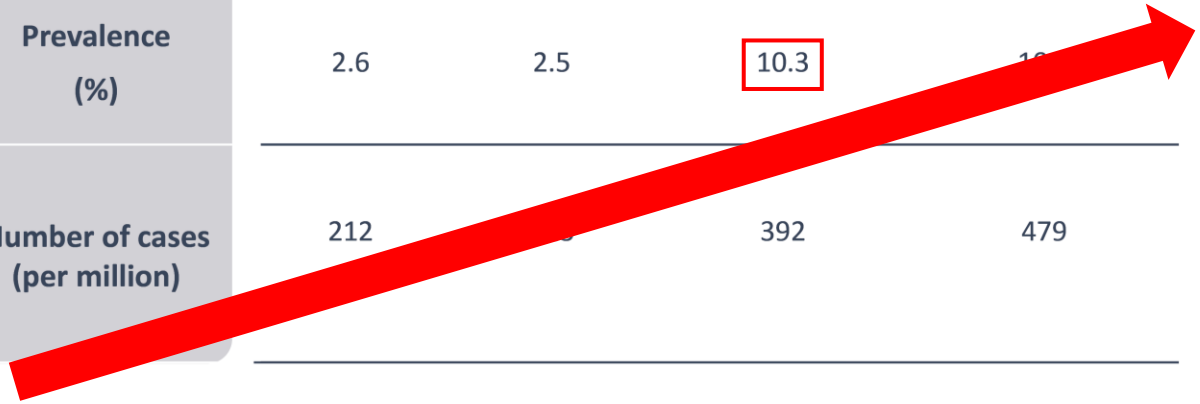
- 기도나 폐포의 이상(기관지염, 세기관지염, 폐기종)으로 인해 공기의 흐름(기류) 이 제한되며, 이로 인해 만성적인 호흡기 증상(숨참, 기침, 가래)을 보이는 폐의 질환이다. 기도와 폐포의 이상은 **다양한 원인**에 의해 생기며, 기류의 제한은 지속적이고 꾸준히 진행될 수 있다.

COPD Prevalence

Estimated COPD Prevalence According to Different Sources

Figure 1.1

	GBD 2019[a]	GBD 2021[b]	Population-based study 2019[c]	Other sources 2020[d]
Prevalence (%)	2.6	2.5	10.3	
Number of cases (per million)	212		392	479



References: [a]Safiri et al. BMJ 2022;378:e069679; [b]Wang et al. Respir Res 2025;26:2; [c]Adeloye et al. Lancet Respir Med 2022;10:447–458; [d]Boers et al. JAMA Netw Open 2023;6:E2346598.

COPD Prevalence in Korea

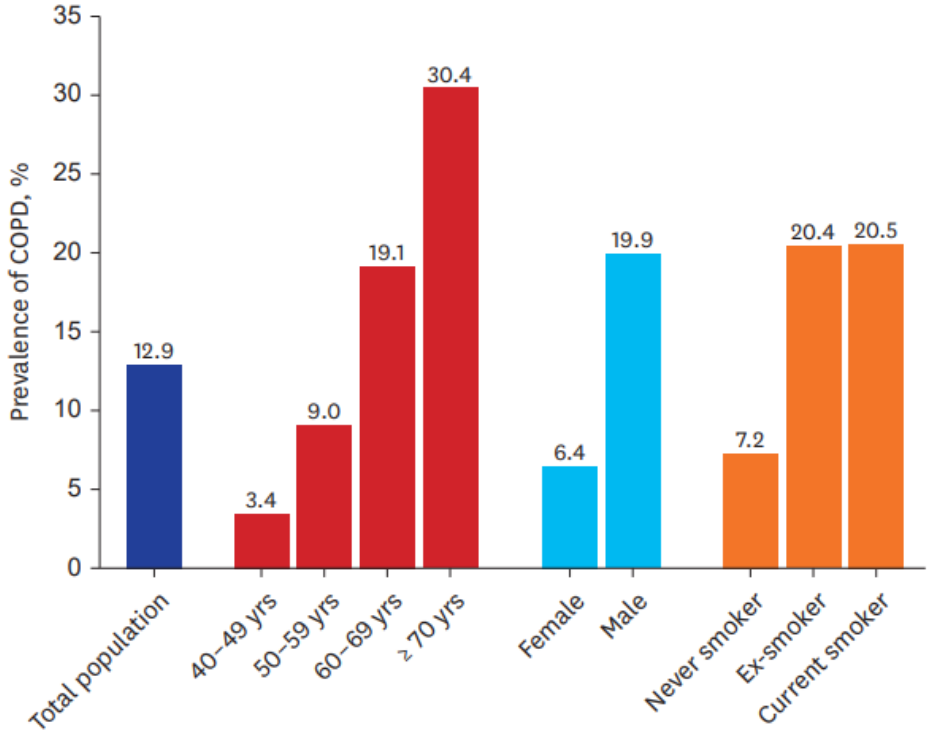


Fig. 2. The overall prevalence of chronic obstructive pulmonary disease in the past five years.
COPD = chronic obstructive pulmonary disease.

한국에서 COPD의 유병률은 다른 나라에서 보다 높게 나타난다. 이는 높은 흡연률 및 결핵의 유병률, 상대적으로 심한 대기 오염 정도, 개발도산국 시절 바이오매스의 과도한 연소 등이 영향 을 미쳤을 가능성이 높다.

ORIGINAL ARTICLE
TUBERCULOSIS

Tuberculosis associates with both airflow obstruction and low lung function: BOLD results

André F.S. Amaral[1], Sonia Coton[1], Bernet Kato[1], Wan C. Tan[2], Michael Studnicka[3], Christer Janson[4], Thorarinn Gislason[5], David Mannino[6], Eric D. Bateman[7], Sonia Buist[8], Peter G.J. Burney[1] and the BOLD Collaborative Research Group[9]

Methods

- Study Design: Multicenter, population-based, cross-sectional analysis of BOLD study
- Participants: Adults≥40 years with acceptable post-BD spirometry and information on history of TB
- Sample Size: 14,050 participants from 19 international sites
- Exposure: Self-reported history of tuberculosis (physician-diagnosed)
- Outcomes:
  - Airflow obstruction: Post-bronchodilator FEV_1/FVC < LLN

Eur Respir J . 2015 Oct;46(4):1104-12..

TB History and Airflow Obstruction

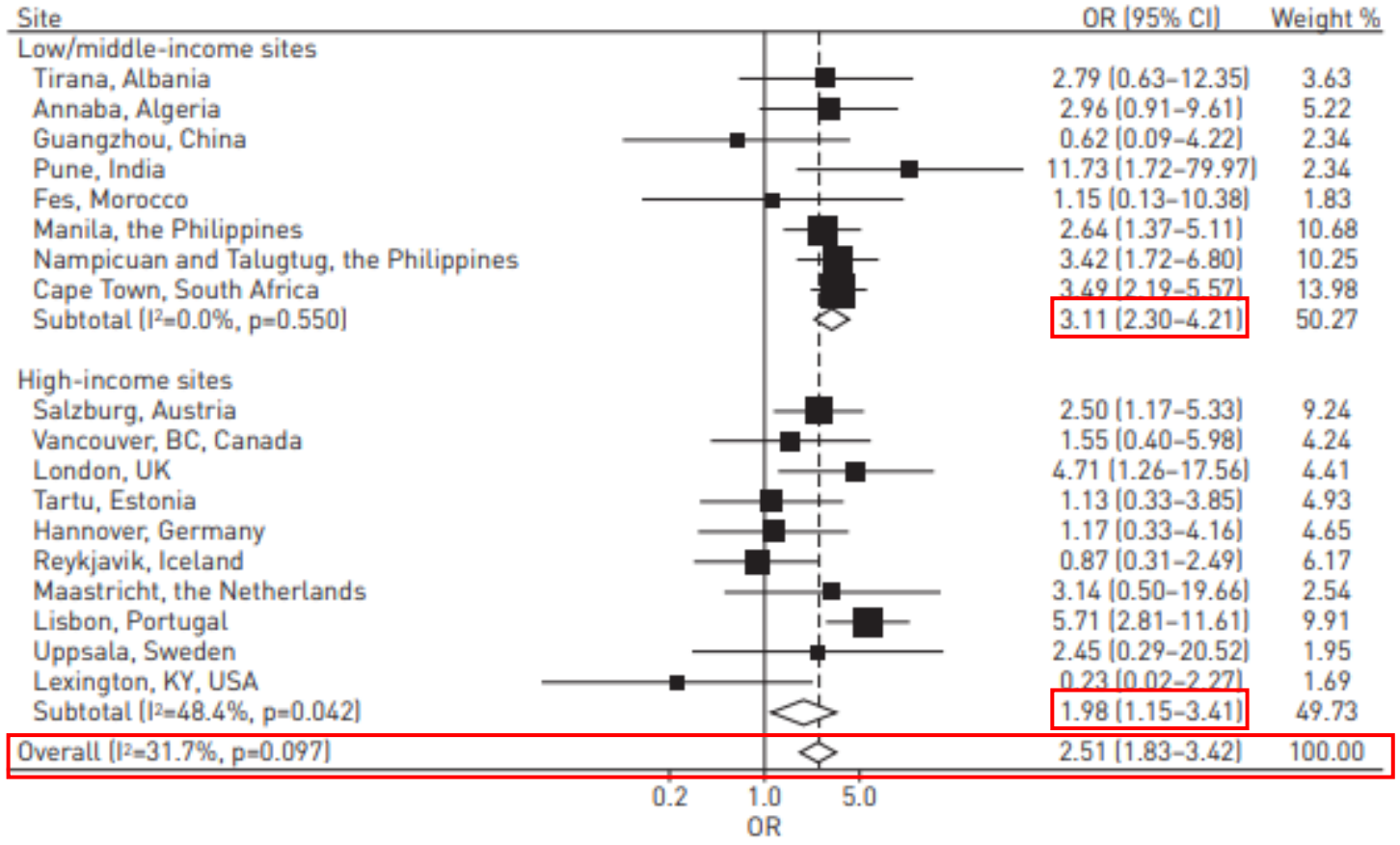
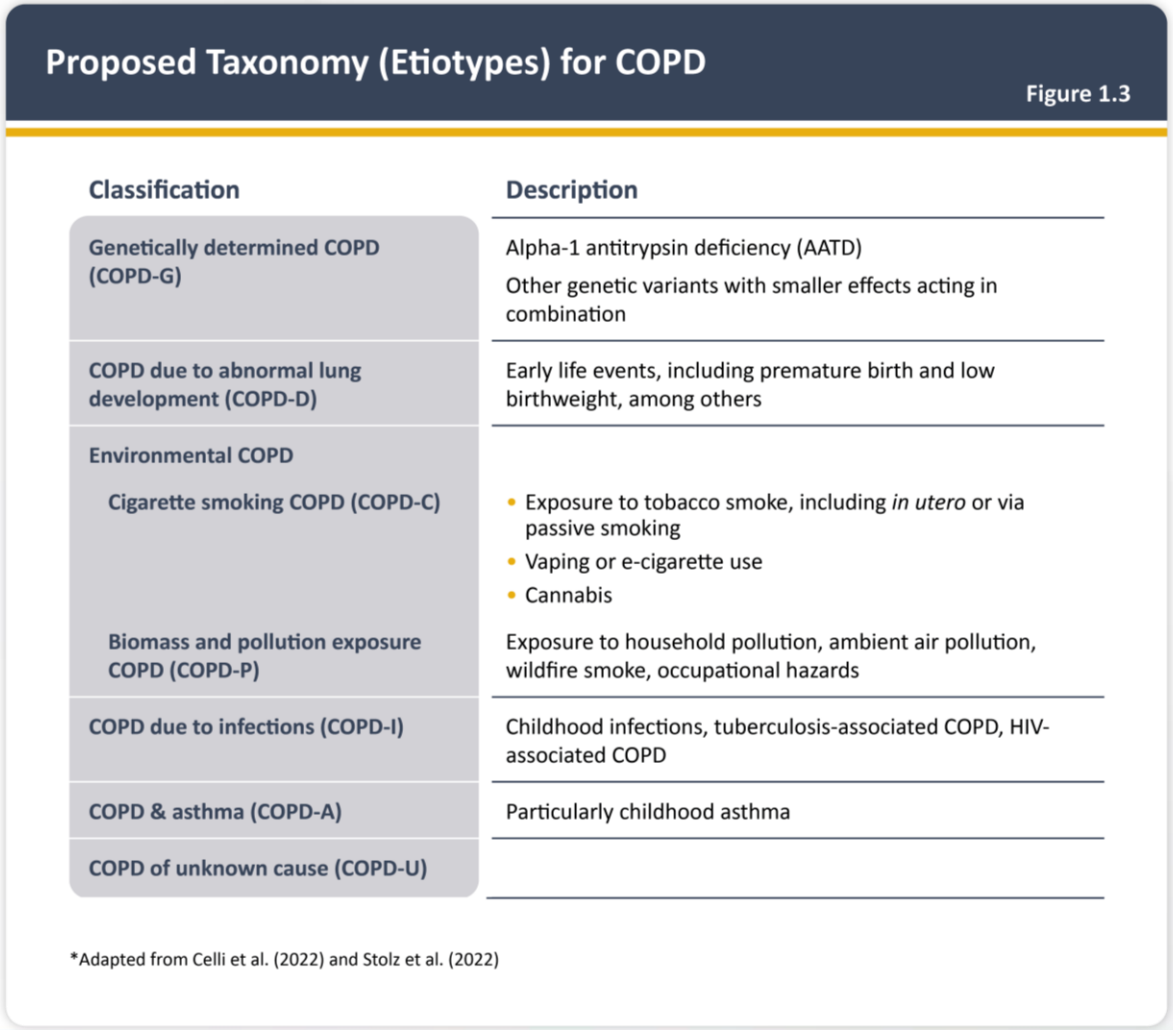


FIGURE 1 Odds ratios of airflow obstruction for a history of tuberculosis, by gross national income group (low/middle versus high) and site. All models were adjusted for age, sex, body mass index and pack-years of smoking.

Causes and Risk Factor



Proposed Taxonomy (Etiotypes) for COPD — Figure 1.3

Classification	Description
Genetically determined COPD (COPD-G)	Alpha-1 antitrypsin deficiency (AATD) Other genetic variants with smaller effects acting in combination
COPD due to abnormal lung development (COPD-D)	Early life events, including premature birth and low birthweight, among others
Environmental COPD	
Cigarette smoking COPD (COPD-C)	• Exposure to tobacco smoke, including *in utero* or via passive smoking • Vaping or e-cigarette use • Cannabis
Biomass and pollution exposure COPD (COPD-P)	Exposure to household pollution, ambient air pollution, wildfire smoke, occupational hazards
COPD due to infections (COPD-I)	Childhood infections, tuberculosis-associated COPD, HIV-associated COPD
COPD & asthma (COPD-A)	Particularly childhood asthma
COPD of unknown cause (COPD-U)	

*Adapted from Celli et al. (2022) and Stolz et al. (2022)

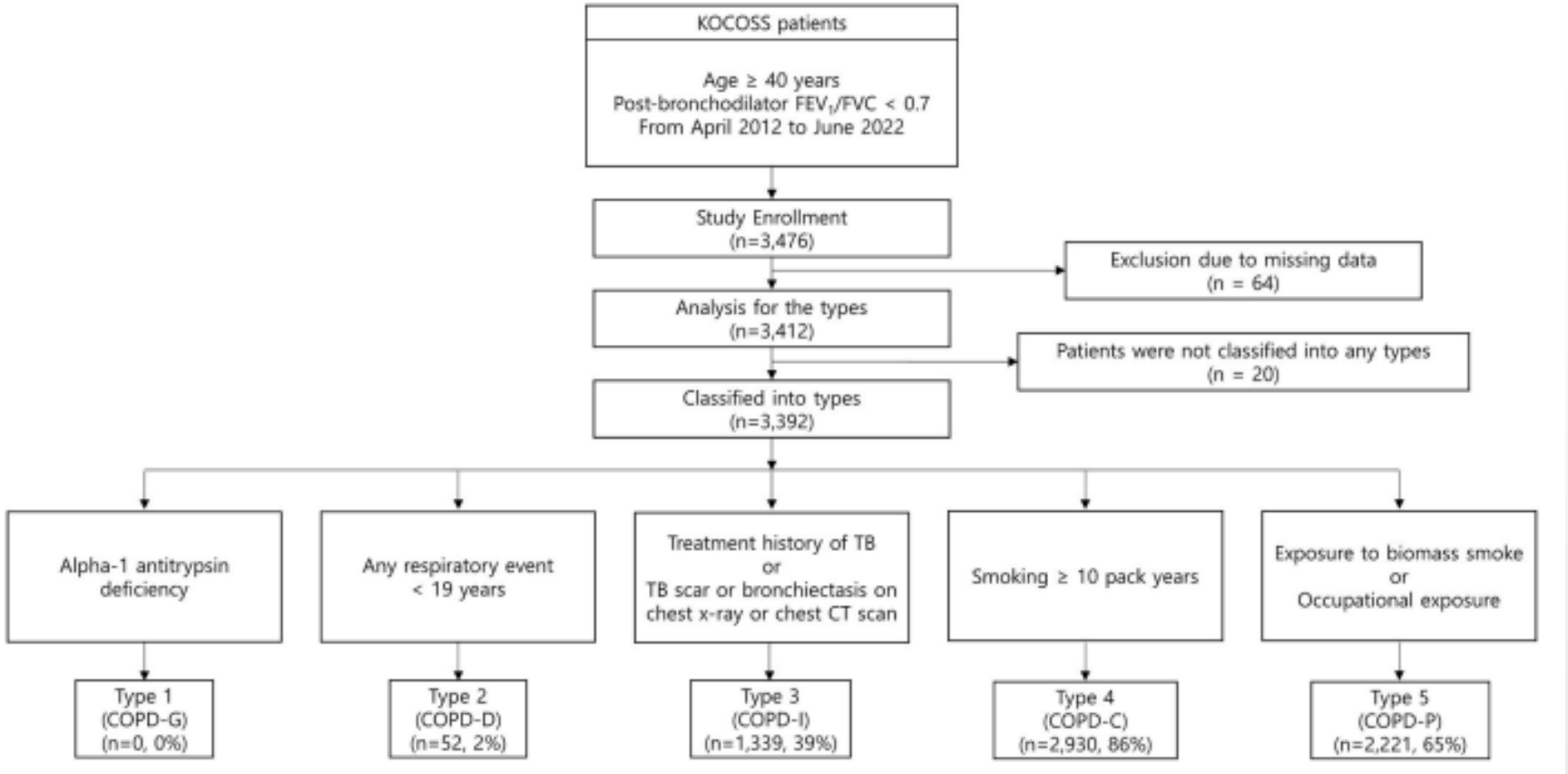
표1-1. COPD 병인형(etiotypes) 분류(taxonomy)

병인 유형	영문 약자	설명
유전(genetic)	COPD-G	알파1-항트립신(alpha1-antitrypsin) 결핍 등 유전적 이상
발달장애(abnormal development)	COPD-D	미숙아, 조산아, 기관지폐형성이상
천식(asthma)	COPD-A	소아천식 등 장기간의 천식 이환
감염(infection)	COPD-I	소아기의 호흡기감염, 폐결핵, 사람면역결핍바이러스
흡연(cigarette)	COPD-C	담배 흡연, 태아/소아/성인기의 간접흡연, 전자담배
바이오매스와 대기오염 노출(pollution)	COPD-P	실내공기오염, 대기오염, 스모그, 산불, 직업적인 노출
원인 미상(unknown)	COPD-U	불분명한 원인
복합적인 병인(mixed causes)	COPD-M	2가지 이상의 병인이 존재

Original Research

Application of the Lancet Commission COPD classification to COPD Cohort Population in South Korea

Hyonsoo Joo [a], Hyoung Kyu Yoon [b], Yong Il Hwang [c], Sang Hyuk Kim [d], Soo-Jung Um [e], Won-Yeon Lee [f], Ki-Suck Jung [c], Kwang Ha Yoo [g], Woo Jin Kim [h], Chin Kook Rhee [i,*]



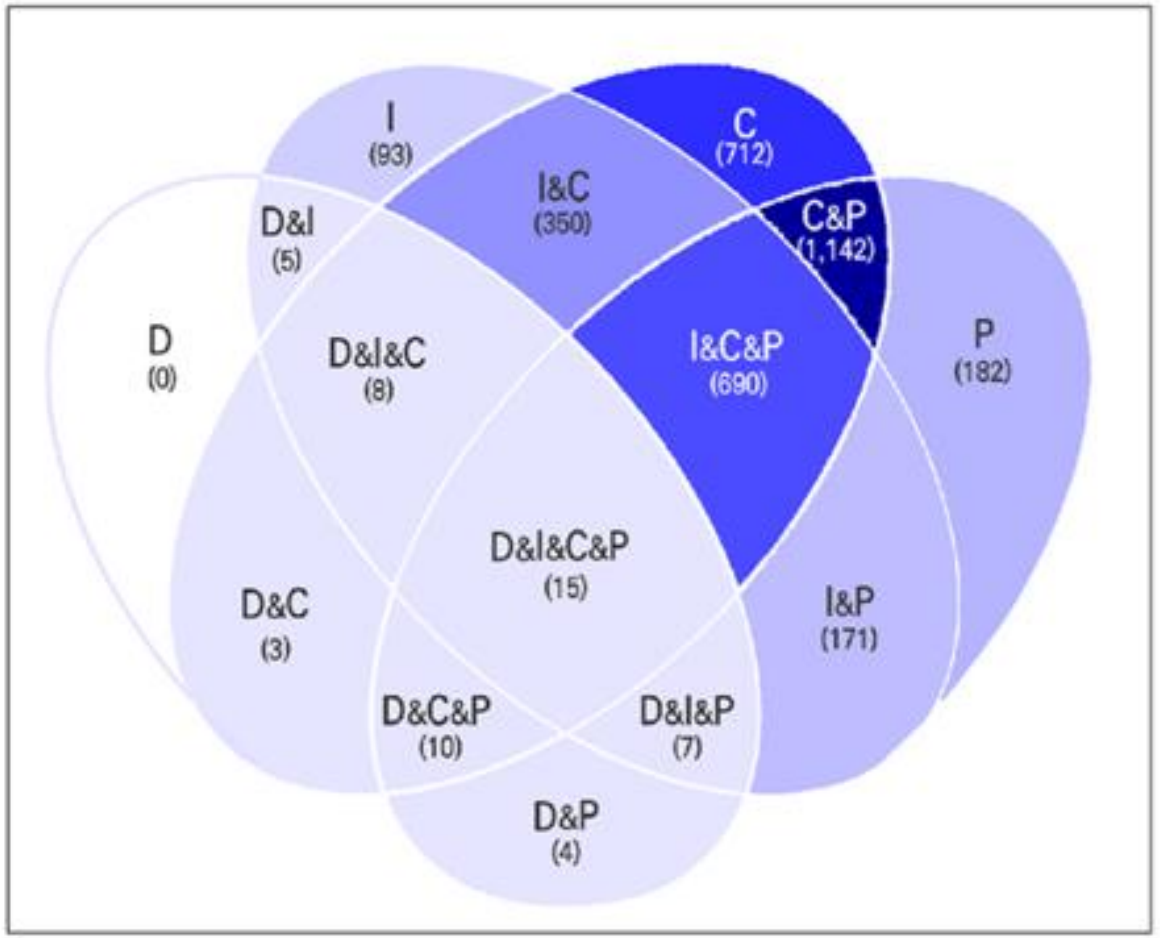


Fig. 2. Venn diagrams showing the overlap of groups by major risk factors.

COPD-G : Genetically determined

COPD-D : Abnormal lung development

COPD-I : Infections

COPD-C : Cigarette smoking

COPD-P : Biomass and pollution

Table 4

Acute exacerbation rates and frequency of non-overlapping COPD during prospective follow-up according to the new classification.

	Type 3 (COPD-I) only (n = 41)	Type 4 (COPD-C) only (n = 296)	Type 5 (COPD-P) only (n = 86)	P-value
Moderate exacerbation over 1 year				
Rate	15 (37 %)	115 (39 %)	26 (30 %)	0.345
Mean number	0.73 ± 1.23	0.88 ± 1.64	0.60 ± 1.27	0.336
Severe exacerbation over 1 year				
Rate	6 (15 %)	22 (7 %)	2 (2 %)	0.038
Mean number	0.24 ± 0.73	0.11 ± 0.49	0.02 ± 0.15	0.048
Moderate to severe exacerbation over 1 year				
Rate	17 (41 %)	123 (42 %)	27 (31 %)	0.228
Mean number	0.98 ± 1.52	0.99 ± 1.84	0.63 ± 1.26	0.227

Data are presented as n, means ± SD or n(%). COPD: chronic obstructive pulmonary disease.

Contents

양산부산대학교병원
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Diagnosis of COPD

Clinical Indicators for Considering a Diagnosis of COPD

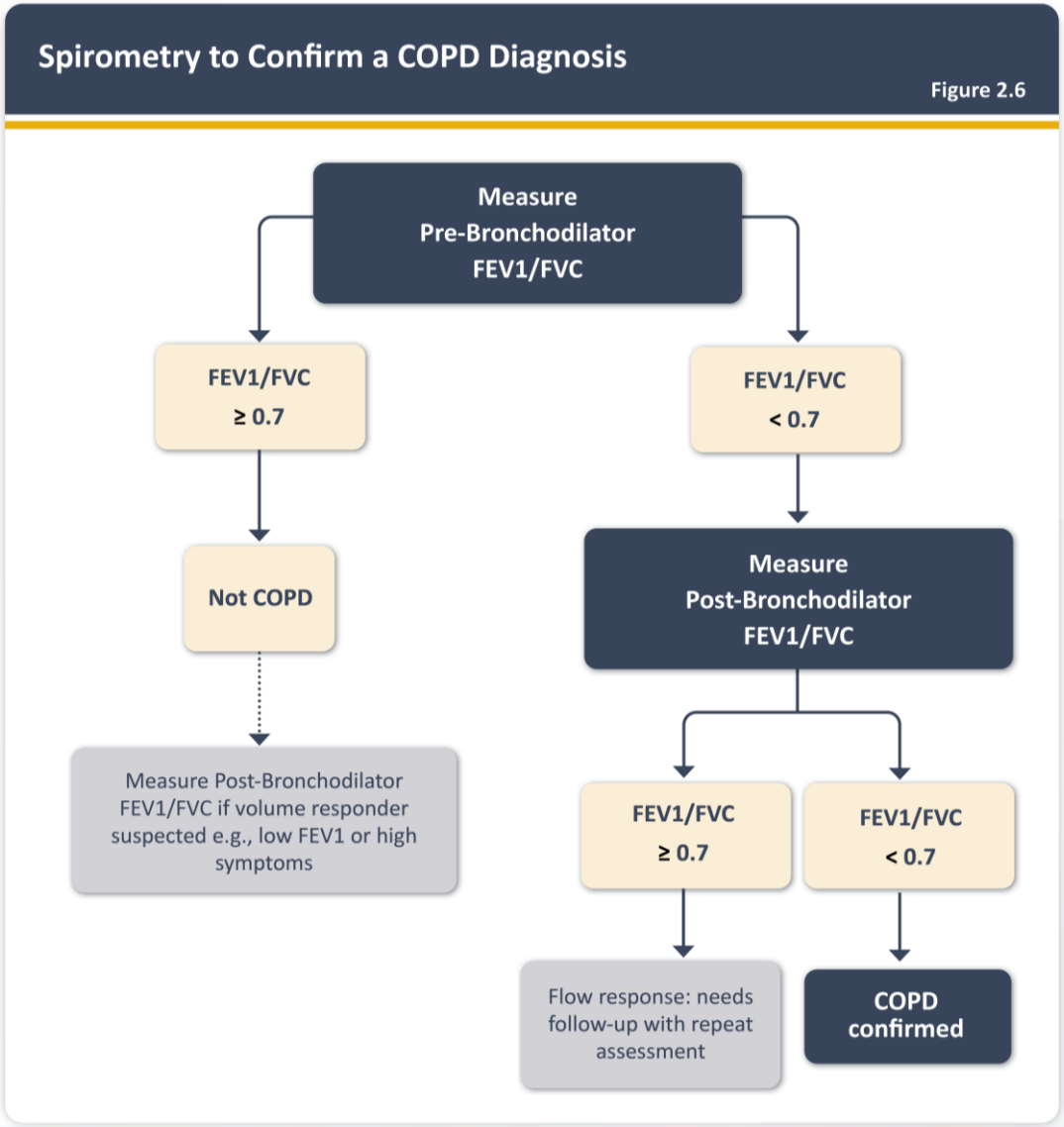
Figure 2.1

Consider the diagnosis of COPD, and perform spirometry, if any of these clinical indicators are present:
(these indicators are not diagnostic themselves, but the presence of multiple key indicators increases the probability of the presence of COPD; in any case, spirometry is required to establish a diagnosis of COPD)

Dyspnea that is	Progressive over time Worse with exercise Persistent
Recurrent wheeze	
Chronic cough	May be intermittent and may be non-productive
Recurrent lower respiratory tract infections	
History of risk factors	Tobacco smoke (including popular local preparations) Smoke from home cooking and heating fuels Occupational dusts, vapors, fumes, gases and other chemicals Host factors (e.g., genetic factors, developmental abnormalities, low birthweight, prematurity, childhood respiratory infections etc.)

Spirometry:
Post-bronchodilator FEV1/FVC < 0.7

Diagnosis of COPD

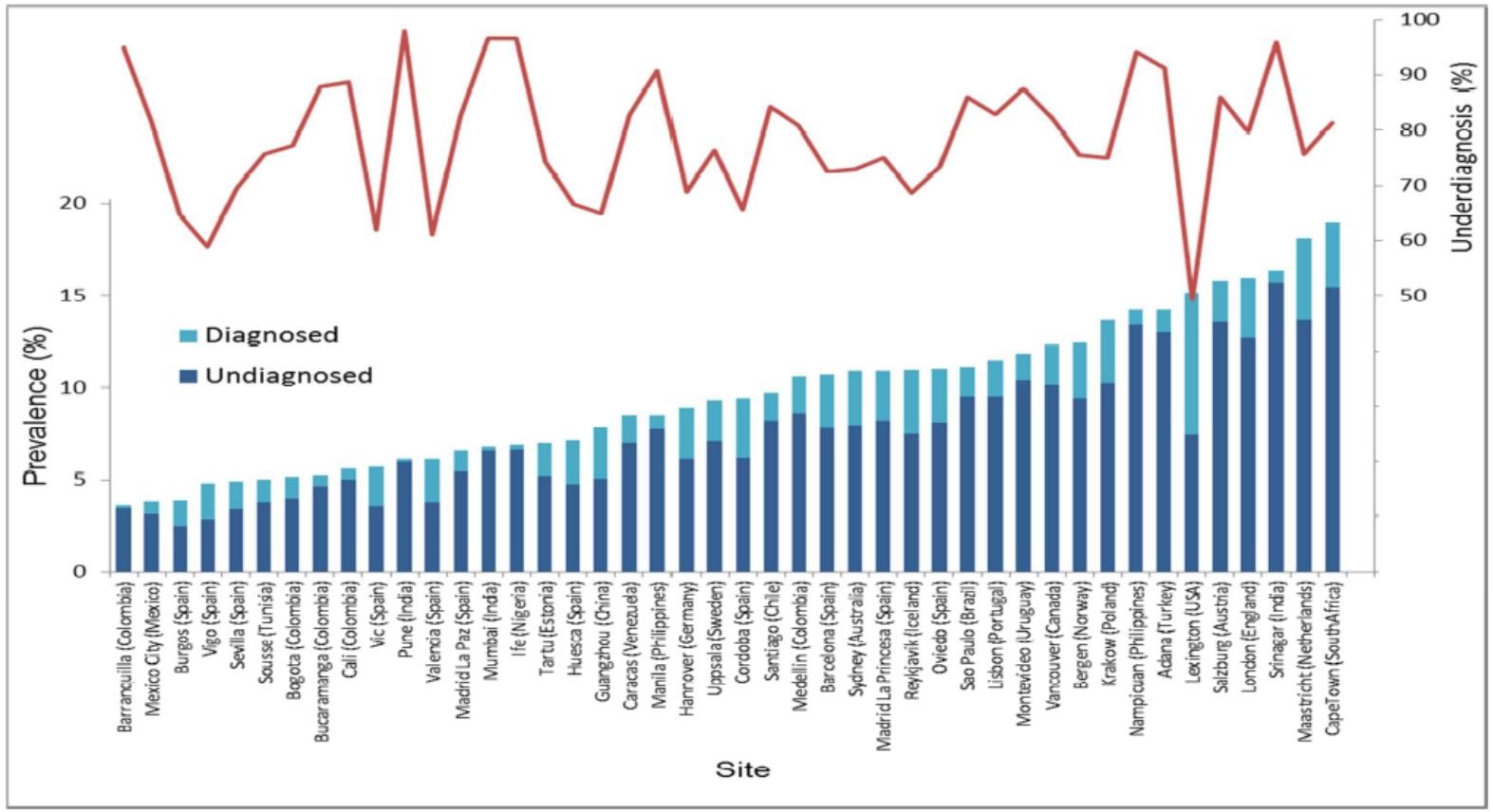


- **Post-bronchodilator FEV1/FVC < 0.7** is **mandatory** to establish the diagnosis of COPD.

- Individuals with a pre-bronchodilator FEV1/FVC ratio that shows obstruction but a post-bronchodilator ratio that does not show obstruction have been shown to have an increased risk of future development of COPD and should be followed closely.

Screening and Case-Finding

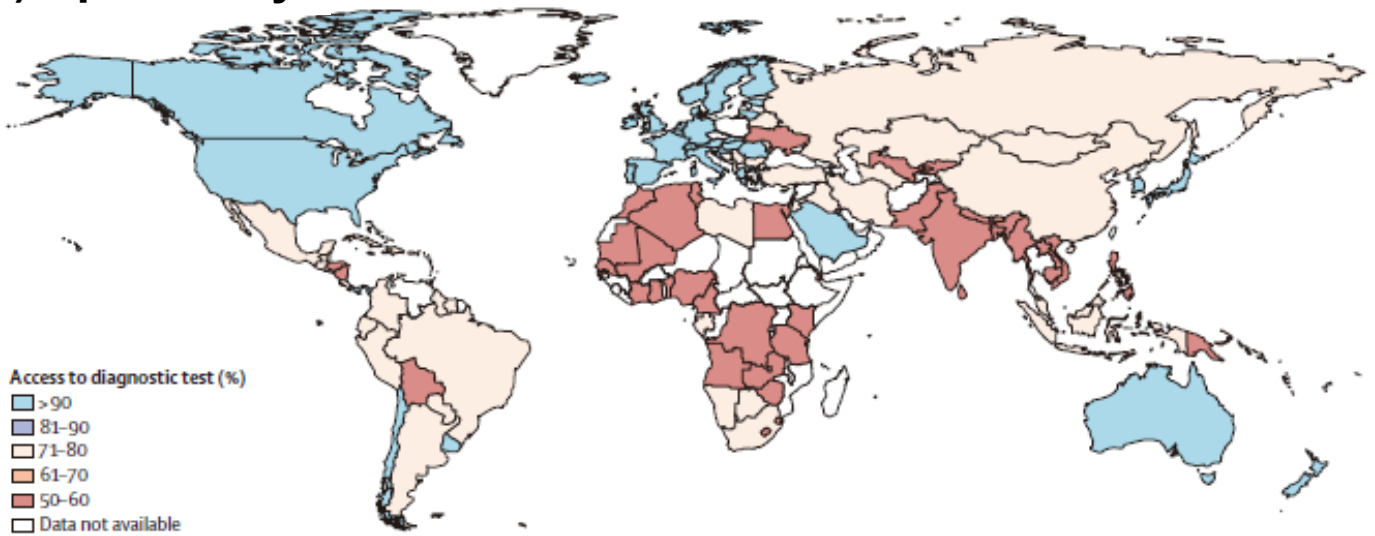
Figure 2. Prevalence of diagnosed and undiagnosed COPD (post-BD FEV1/FVC<LLN) and relative underdiagnosis by study site



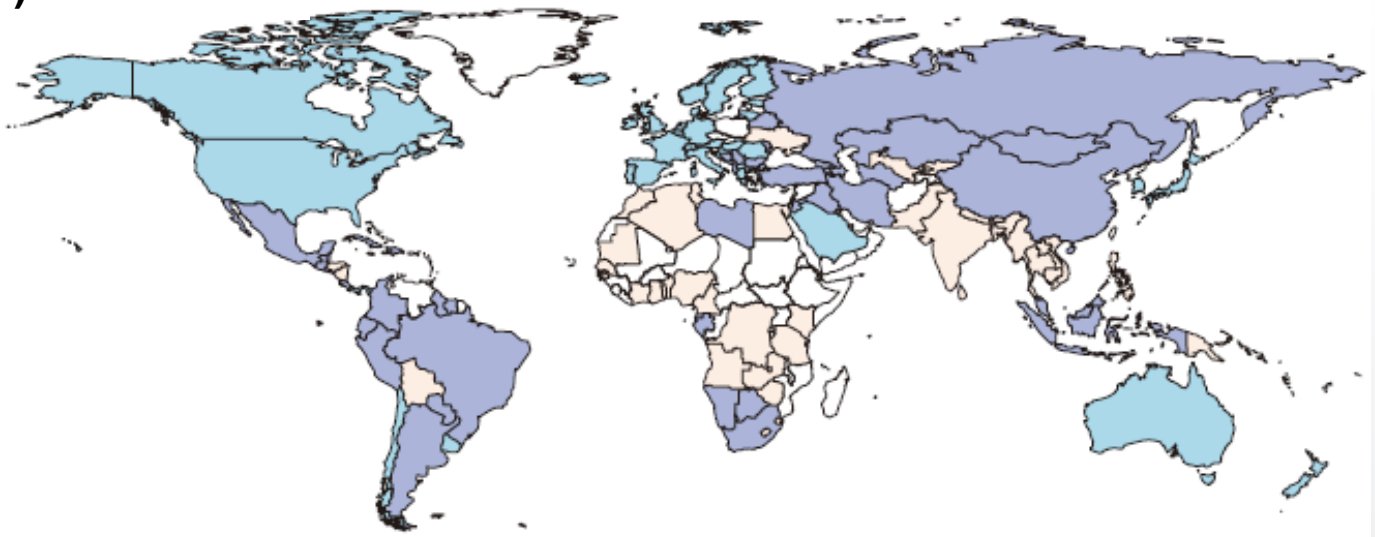
- A 27-country collaborative study found a prevalence of COPD, of 9.7%, with 81% of COPD cases being undiagnosed.
- The problem of COPD underdiagnosis(90–95% of COPD cases) was worse in LMICs.

Proportion of global population with access for diagnosis of COPD

(A) Spirometry



(B) Chest CT



	Primary and specialist care	Primary care only	Specialist care only	Limited* availability in primary or specialist care, or both	Not available
Lower-middle-income countries (n=11)					
Spirometry	2 (18%)	0	4 (36%)	5 (45%)	0
Reversibility testing	1 (9%)	0	6 (55%)	4 (36%)	0
Whole body plethysmography	0	0	3 (27%)	5 (45%)	3 (27%)
Diffusion capacity measurement	0	0	3 (27%)	5 (45%)	3 (27%)
Arterial blood gas analysis	0	0	6 (55%)	5 (45%)	0
Chest radiography	6 (55%)	3 (27%)	0	2 (18%)	0
Chest CT	1 (9%)	0	7 (64%)	3 (27%)	0
Upper-middle-income countries (n=15)					
Spirometry	3 (20%)	2 (13%)	6 (40%)	4 (27%)	0
Reversibility testing	2 (13%)	1 (7%)	8 (53%)	4 (27%)	0
Whole body plethysmography	0	0	5 (33%)	9 (60%)	1 (7%)
Diffusion capacity measurement	0	0	6 (40%)	8 (53%)	1 (7%)
Arterial blood gas analysis	1 (7%)	2 (13%)	8 (53%)	4 (27%)	0
Chest radiography	8 (53%)	4 (27%)	3 (20%)	0	0
Chest CT	3 (20%)	0	10 (67%)	2 (13%)	0
High-income countries (n=17)					
Spirometry	12 (71%)	1 (6%)	3 (18%)	1 (6%)	0
Reversibility testing	8 (47%)	0	9 (53%)	0	0
Whole body plethysmography	0	0	16 (94%)	1 (6%)	0
Diffusion capacity measurement	1 (6%)	0	14 (82%)	2 (12%)	0
Arterial blood gas analysis	1 (6%)	0	15 (88%)	1 (6%)	0
Chest radiography	12 (71%)	0	4 (24%)	1 (6%)	0
Chest CT	4 (24%)	0	12 (71%)	1 (6%)	0

Table 1: **Availability of tests considered relevant in the diagnosis of chronic obstructive pulmonary disease, by country income group**

Stolz et al. Lancet. 2022 Sep 17;400(10356):921-972.

Proposed diagnostic algorithm for COPD

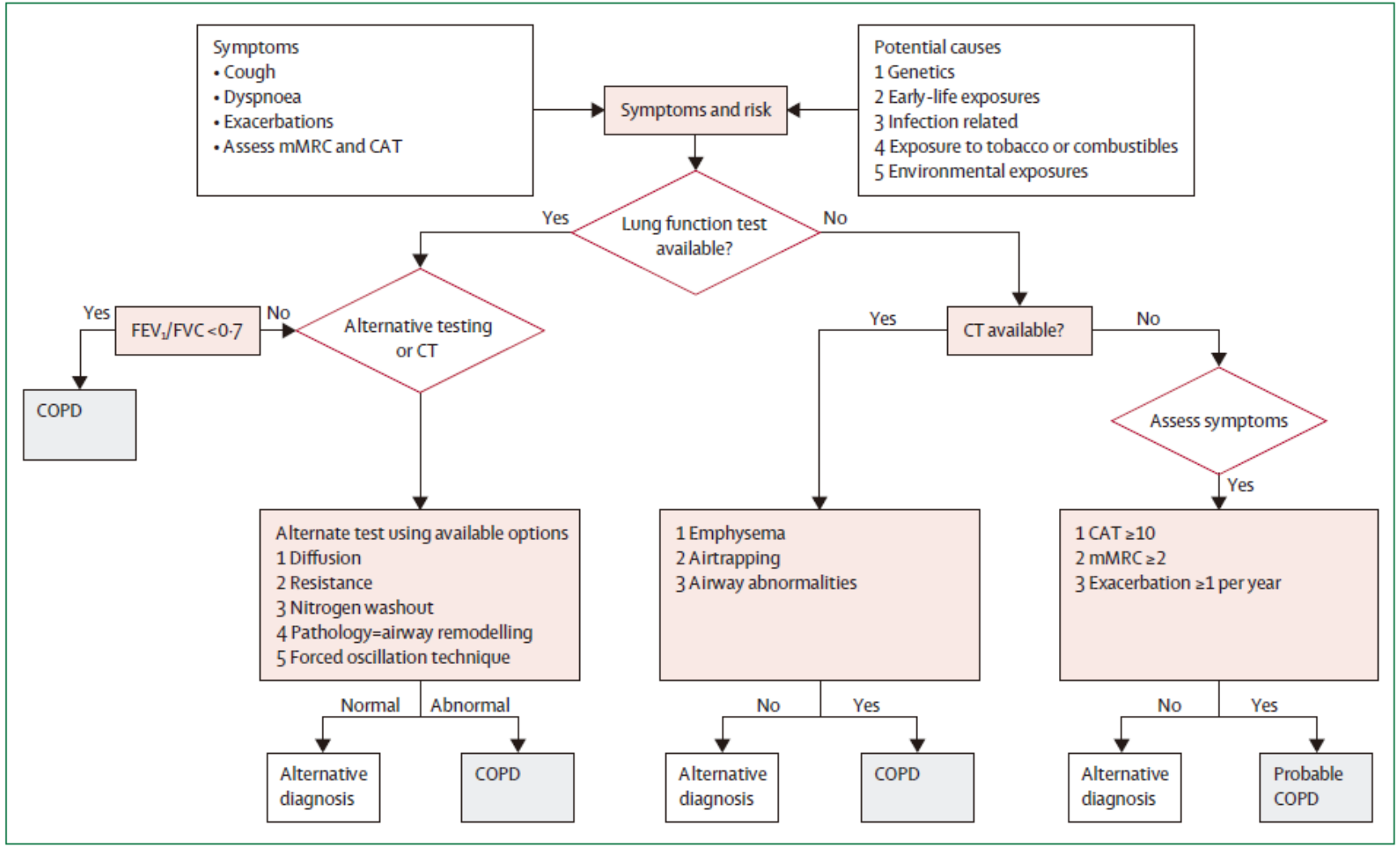


Figure 11: **Proposed diagnostic algorithm for COPD**

COPD=chronic obstructive pulmonary disease. mMRC=modified medical research council scale. CAT=COPD assessment test. FEV_1=forced expiratory volume in 1 s. FVC=forced vital capacity.

JAMA | Original Investigation

A Multidimensional Diagnostic Approach for Chronic Obstructive Pulmonary Disease

COPDGene 2025 Diagnosis Working Group and CanCOLD Investigators

Figure 1. Diagnostic Schema for Chronic Obstructive Pulmonary Disease (COPD) Using Major and Minor Criteria

DIAGNOSTIC CRITERIA

Major	Minor: imaging	Minor: symptoms
Airflow obstruction FEV_1/FVC <0.70 *or* FEV_1/FVC <LLN	Emphysema ≥Mild visual emphysema Bronchial wall thickening	Dyspnea mMRC score ≥2 Quality of life SGRQ score ≥25 *or* CAT score ≥10 Chronic bronchitis

DIAGNOSIS

Chronic obstructive pulmonary disease

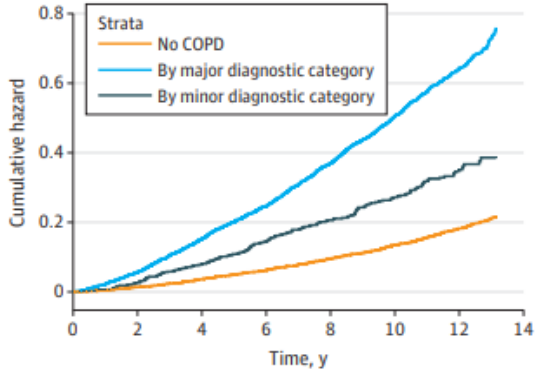
Major diagnostic category	Minor diagnostic category
Major criterion *plus* ≥1 Minor criterion	≥3 Minor criteria *If symptoms are explained by other diseases, both imaging criteria should be met.*

Figure 2. Reclassification of Participants by New Diagnostic Schema by Global Initiative for Chronic Obstructive Lung Disease (GOLD) Stage

- 811 of 5250 individuals (15.4%) without airflow obstruction were newly classified as having COPD by minor diagnostic category, and 282 of 4166 individuals (6.8%) with airflow obstruction were classified as not having COPD.

Figure 3. Associations Between Clinical Outcomes and Chronic Obstructive Pulmonary Disease (COPD) Status by New Diagnostic Schema in Genetic Epidemiology of COPD

A Multivariable cumulative hazards plot of all-cause mortality by COPD category

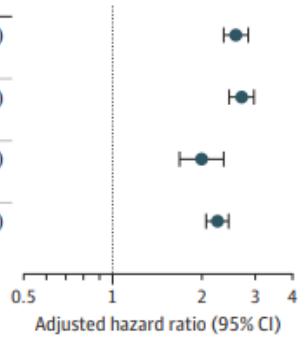


No. at risk

No COPD	4721	4183	3986	3612	3276	2932	1820
By major diagnostic category	3884	3495	3100	2626	2160	1763	1015
By minor diagnostic category	811	670	598	517	423	354	201

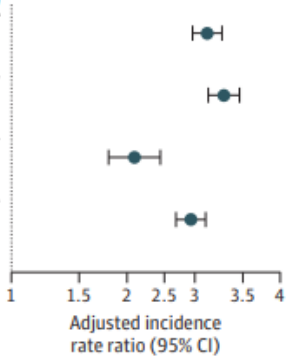
B Adjusted hazard ratio for all-cause mortality by COPD category

	Adjusted hazard ratio (95% CI)
Overall COPD by new diagnostic schema	2.58 (2.35-2.84)
COPD by major diagnostic category	2.70 (2.45-2.97)
COPD by minor diagnostic category	1.98 (1.67-2.35)
COPD per GOLD criteria	2.24 (2.05-2.44)



C Adjusted incidence rate ratio for exacerbations

	Adjusted incidence rate ratio (95% CI)
Overall COPD by new diagnostic schema	3.23 (2.96-3.53)
COPD by major diagnostic category	3.57 (3.25-3.92)
COPD by minor diagnostic category	2.09 (1.79-2.44)
COPD per GOLD criteria	2.93 (2.68-3.20)



D Adjusted annualized change in FEV_1

	Adjusted annualized FEV_1 change, mL/y (95% CI)
Overall COPD by new diagnostic schema	-16.1 (-19.5 to -12.7)
COPD by major diagnostic category	-19.5 (-23.3 to -15.6)
COPD by minor diagnostic category	-7.7 (-13.2 to -2.3)
COPD per GOLD criteria	-15.4 (-18.9 to -11.9)

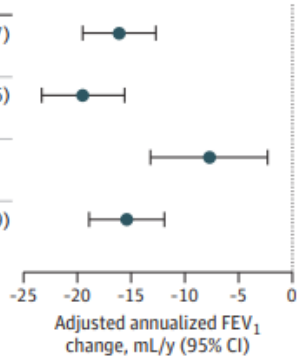
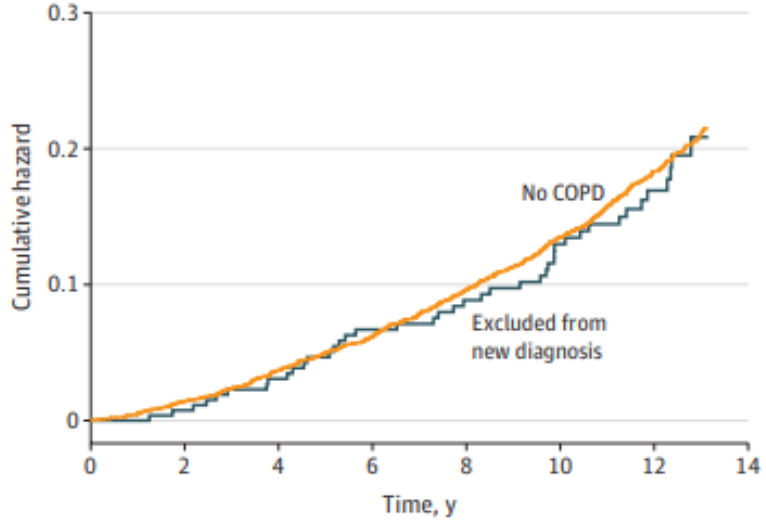


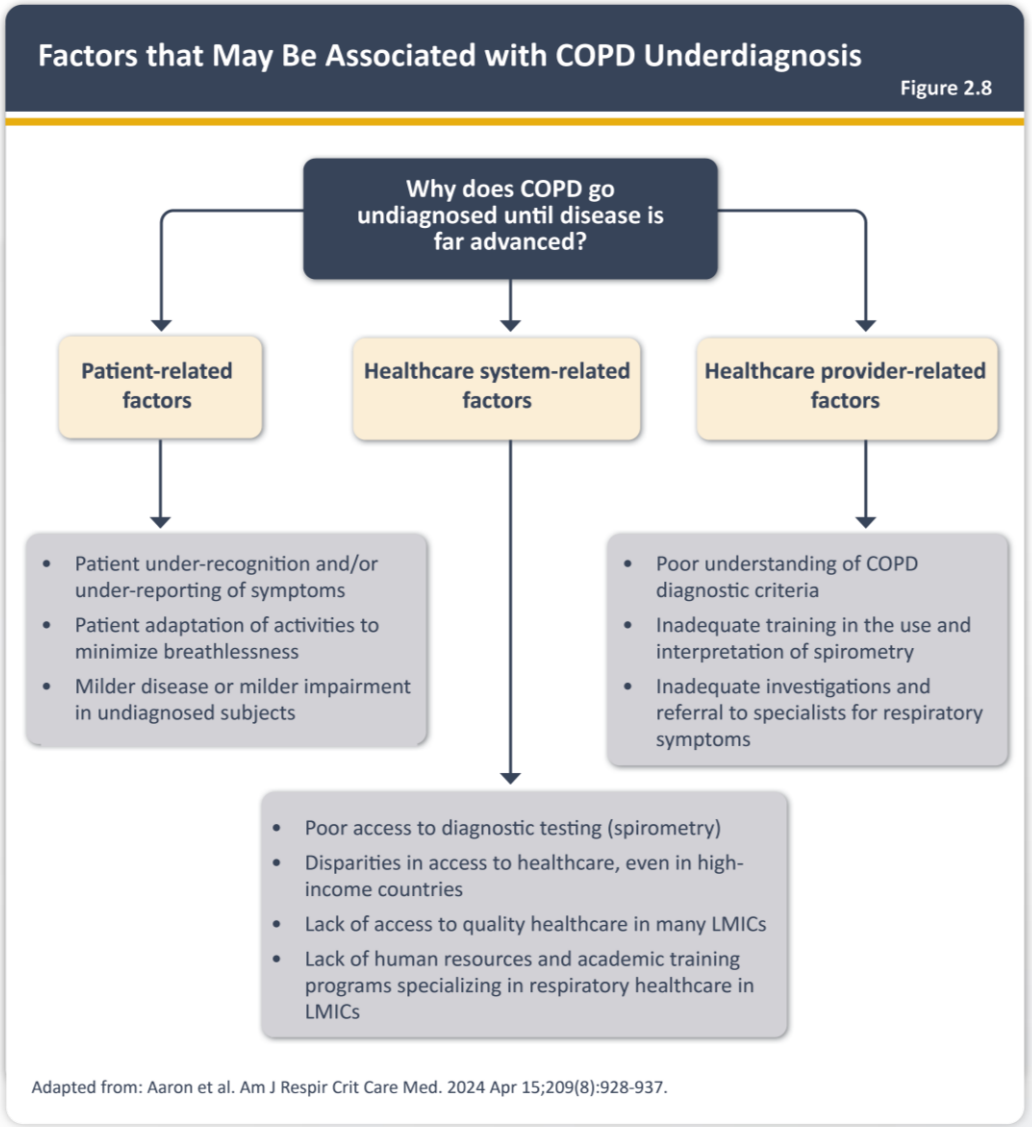
Figure 4. Associations Between the Category Excluded From Chronic Obstructive Pulmonary Disease (COPD) Diagnosis and Clinical Outcomes in the Genetic Epidemiology of COPD Study[a]



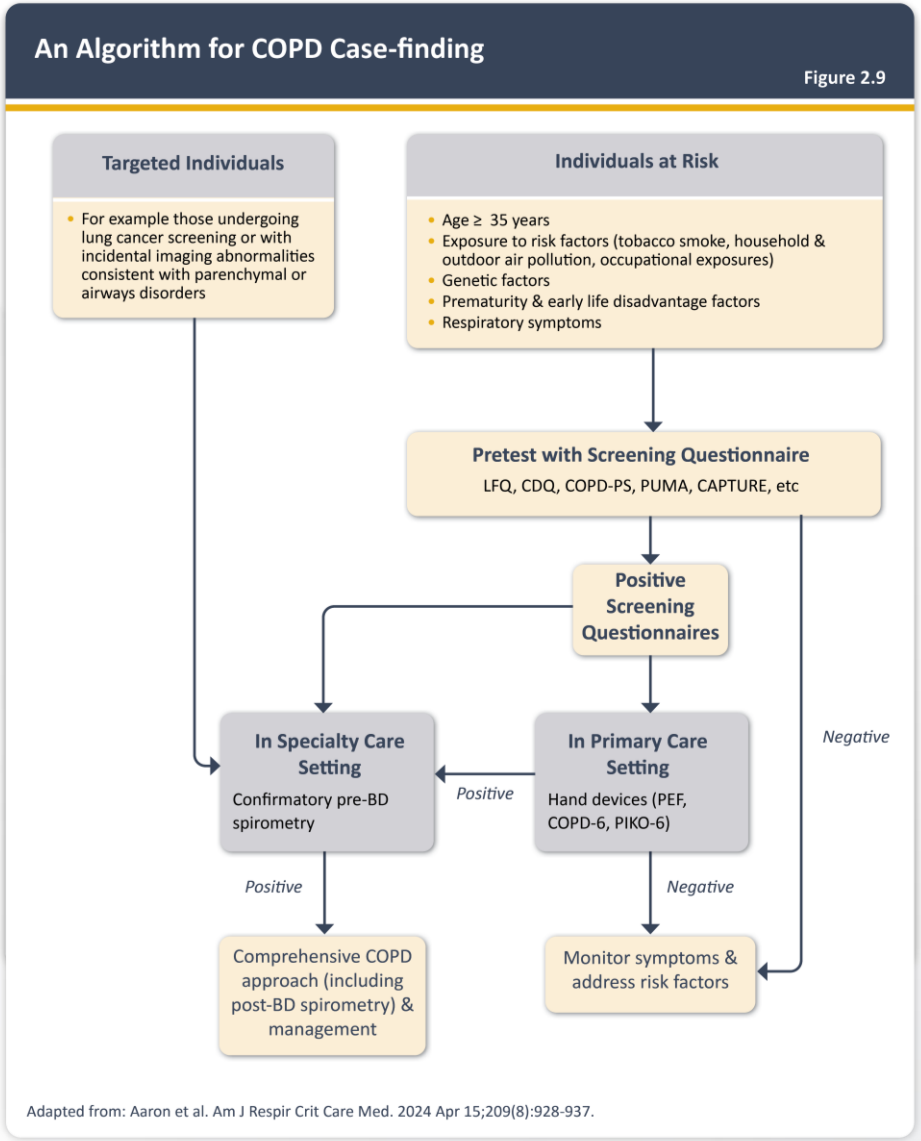
No. at risk

No COPD	4439	3920	3731	3370	3048	2721	1682
Excluded from new diagnosis	282	263	255	242	228	211	138

Screening and Case-Finding



Screening and Case-Finding



Adapted from: Aaron et al. Am J Respir Crit Care Med. 2024 Apr 15;209(8):928-937.

ORIGINAL ARTICLE

Use of CAPTURE to Identify Individuals Who May or May Not Require Treatment for Chronic Obstructive Pulmonary Disease

Yun Li[1], Fuqiang Wen[2], Qianli Ma[3], Rongchang Chen[4], Yongchang Sun[5], Tiantian Liu[6], Chenjuan Gu[6], Shuling Hu[6], Jie Song[6], Chris Compton[7], Jinping Zheng[1], Nanshan Zhong[1], and Paul Jones[7]

[1]Department of Pulmonary and Critical Care Medicine, the First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China; [2]Department of Pulmonary and Critical Care Medicine, West China Hospital of Sichuan University, Chengdu, China; [3]Department of Pulmonary and Critical Care Medicine, the North Kuanren General Hospital, Chongqing, China; [4]Department of Pulmonary and Critical Care Medicine, Shenzhen People's Hospital, Shenzhen, China; [5]Department of Pulmonary and Critical Care Medicine, Peking University Third Hospital, Beijing, China; [6]GSK, Shanghai, China; and [7]Global Medical, Global Specialty & Primary Care TA, GSK, Brentford, United Kingdom

CAPTURE*™

For each question, place an X in the box with the answer that is best for you.
There are no right or wrong answers, only answers which are right for you.

Please answer each question	No		Yes
1. Have you ever lived or worked in a place with dirty or polluted air, smoke, second-hand smoke, or dust?	☐		☐
2. Does your breathing change with seasons, weather, or air quality?	☐		☐
3. Does your breathing make it difficult to do things such as carry heavy loads, shovel dirt or snow, jog, play tennis, or swim?	☐		☐
4. Compared to others of your age, do you tire easily?	☐		☐
	0	1	2 or more
5. In the past 12 months, how many times did you miss work, school, or other activities due to a cold, bronchitis, or pneumonia?	☐	☐	☐

*COPD Assessment in Primary Care to identify Undiagnosed Respiratory Disease & Exacerbation Risk

The CAPTURE™ (COPD assessment in primary care to identify undiagnosed respiratory disease and exacerbation risk) questionnaire.

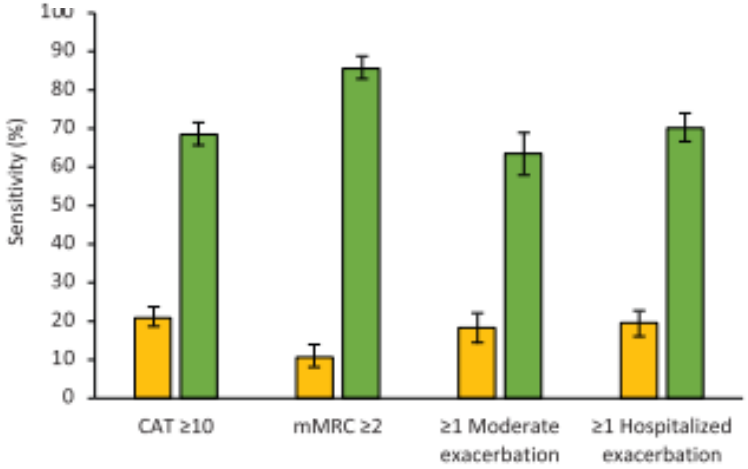
- **Background**

CAPTURE was developed to identify undiagnosed COPD patients likely to require treatment based on symptoms or exacerbation risk.

- **Methods**

Data Source: China's large-scale prospective cohort COMPASS
Subjects: COPD patients: 1,696
Chronic bronchitis (CB, no airflow limitation): 180
Normal control group: 127
CAPTURE Assessment: Survey only vs. Survey + PEF (Low PEF if <250 L/min for women, <350 L/min for men)
Treatment-related criteria: CAT > 10, mMRC > 2, Moderate exacerbation ≥1 in the past year, Hospitalization due to exacerbation ≥1 in the past year

A Sensitivity: **63.5–85.6%**



B Specificity: **55.6–64.0%**

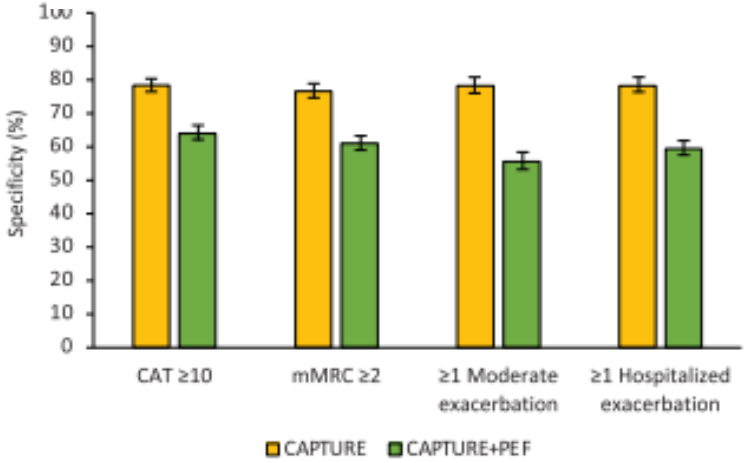


Figure 1. Sensitivity (A) and Specificity (B) value for CAPTURE questions + PEF in participants with COPD and CAT ⩾10 vs <10, mMRC ⩾2 vs <2, and ⩾1 moderate exacerbation in previous year vs none, and ⩾1 severe (hospitalized) exacerbation in previous year vs none. Error bars represent 95% confidence intervals. CAT = COPD Assessment Test; mMRC = modified Medical Research Council; PEF = peak expiratory flow.

Table 6. PPV and NPV for Questions and PEF to Detect CAT (⩾10 vs <10), mMRC (⩾2 vs <2) and Exacerbations in the Previous Year (⩾1 vs 0). Values are Mean (95% CI)

	CAT	mMRC	Moderate exacerbations	Severe exacerbations
PPV	47.8 (44.6–51.0)	29.9 (27.0–32.8)	15.6 (13.3–18.0)	30.3 (27.4–33.3)
NPV	80.8 (78.5–83.2)	95.6 (94.4–96.8)	92.1 (90.5–93.8)	88.8 (86.9–90.7)

Definition of abbreviations: CAT = COPD Assessment Test; CI = confidence interval; COPD = chronic obstructive pulmonary disease; mMRC = modified Medical Research Council; NPV = negative predicted values; PEF = peak expiratory flow; PPV = positive predicted values.

Diagnosis of COPD in Korean guideline

COPD는 흡연을 포함하여 기도나 폐실질의 이상을 초래하는 다양한 위험인자에 노출된 성인에서 호흡곤란, 기침, 가래가 만성적으로 있는 경우 의심해야 하며, 폐활량측정법으로 진단한다[7, 134]. 폐활량측정 결과 $FEV_1/FVC < 0.70$이면 기류제한이 있다고 할 수 있는데, COPD 환자의 정확한 진단을 위해서는 기관지확장제를 투여한 후에 폐활량을 측정하여 기류제한 유무를 확인한다.

표 2-1. COPD를 의심해야 하는 지표

아래와 같은 임상적 지표들이 있을 경우 폐기능 검사를 포함하여 COPD에 대한 진단적 평가를 시행해야 한다. 이 지표들이 다수 있다면 COPD 가능성이 높아진다.

호흡곤란	시간이 지남에 따라 진행함
	운동시 심해짐
	지속적임
반복적인 천명음	
만성 기침	간헐적이거나 마른 기침일 수도 있음
반복적인 하기도 감염	
위험 인자를 가지고 있음	흡연
	실내 오염원 (요리, 난방 등)
	직업적 노출 (먼지, 증기, 가스, 매연, 화학물질)
	숙주 인자 (유전, 선천 기형, 저체중, 조산, 영유아기 반복적 폐감염 등)

Initial Assessment

2026 GOLD

- **Severity of airflow obstruction**
- Nature and Management of **current symptoms**
- Previous history of moderate and severe **exacerbations**
- **Blood eosinophil count**
- Presence and type of other diseases (**multimorbidity**)

2024 진료지침

- 증상의 성상과 크기(Nature and magnitude of current symptoms)
- 기류제한의 중증도(Severity of airflow obstruction)
- 중등증, 중증 악화의 과거력(previous history of moderate and severe exacerbation)
- 혈액 호산구 수치(Blood eosinophil count)
- 동반 질환의 종류(Presence and type of other diseases; multimorbidity)

Severity of airflow obstruction

GOLD Grades and Severity of Airflow Obstruction in COPD (based on post-bronchodilator FEV1)

Figure 2.10

In patients with COPD (FEV1/FVC < 0.7):

GOLD 1:	Mild	FEV1 ≥ 80% predicted
GOLD 2:	Moderate	50% ≤ FEV1 < 80% predicted
GOLD 3:	Severe	30% ≤ FEV1 < 50% predicted
GOLD 4:	Very Severe	FEV1 < 30% predicted

Assessment of Symptoms (Dyspnea)

2026 GOLD

Modified MRC Dyspnea Scale

Figure 2.11

PLEASE TICK IN THE BOX THAT APPLIES TO YOU | ONE BOX ONLY | Grades 0 - 4

mMRC Grade 0	mMRC Grade 1	mMRC Grade 2	mMRC Grade 3	mMRC Grade 4
I only get breathless with strenuous exercise ☐	I get short of breath when hurrying on the level or walking up a slight hill ☐	I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level ☐	I stop for breath after walking about 100 meters or after a few minutes on the level ☐	I am too breathless to leave the house or I am breathless when dressing or undressing ☐

Reference: American Thoracic Society. Am Rev Respir Dis 1982;126(5):952-6.

2024 진료지침

표 2-4. modified Medical Research Council Dyspnea Scale (mMRC) 호흡곤란 점수

mMRC 호흡곤란점수	호흡곤란 내용
0	힘든 운동을 할 때만 숨이 차다
1	평지를 빨리 걷거나, 약간 오르막 길을 걸을 때 숨이 차다.
2	평지를 걸을 때 숨이 차서 동년배보다 천천히 걷거나, 자신의 속도로 걸어도 숨이 차서 멈추어 쉬어야 한다.
3	평지를 약 100 m 정도 걷거나, 몇 분 동안 걸으면 숨이 차서 멈추어 쉬어야 한다.
4	숨이 너무 차서 집을 나설 수 없거나, 옷을 입거나 벗을 때도 숨이 차다.

Assessment of Symptoms (QoL)

2026 GOLD

CAAT™ Assessment

Figure 2.12

For each item below, place a mark (x) in the box that best describes you currently.
Be sure to only select one response for each question.

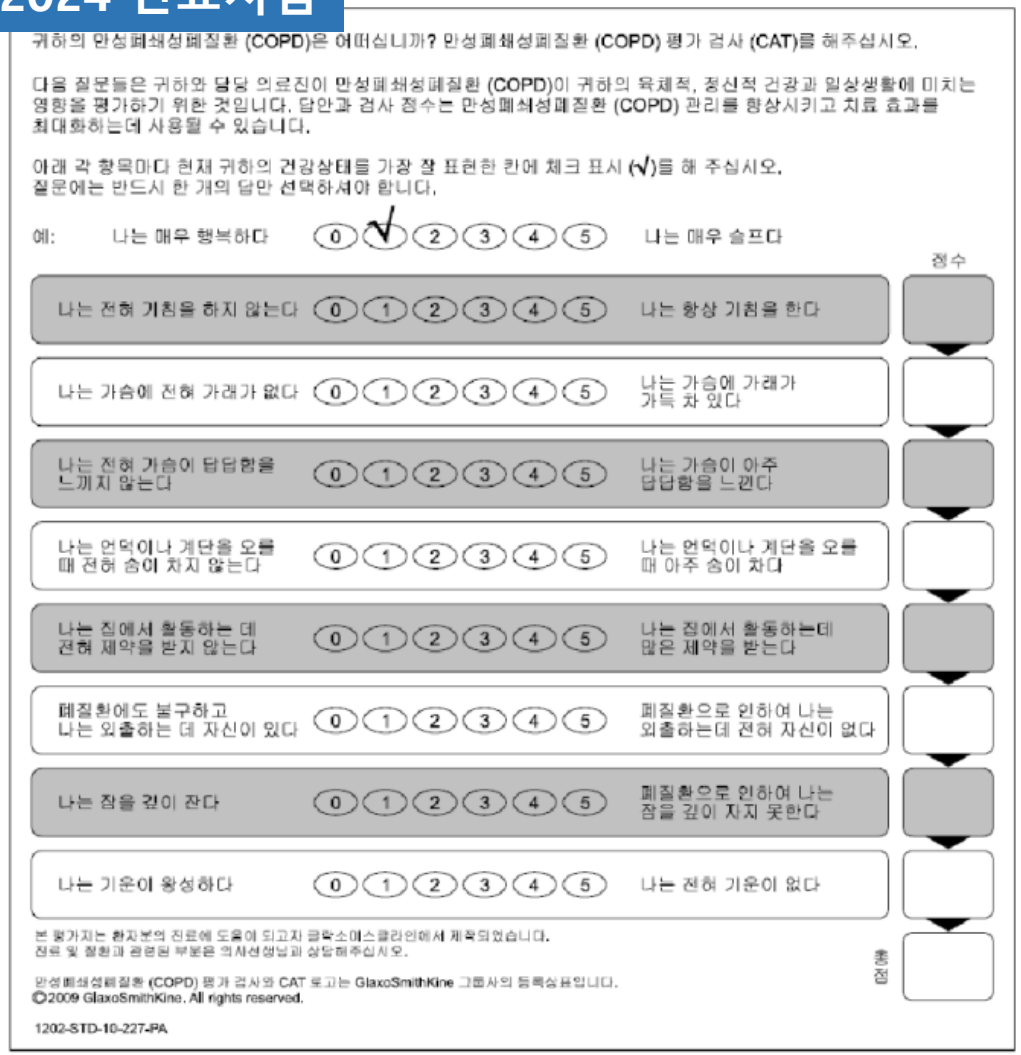
EXAMPLE: I am very happy	0 X 2 3 4 5	I am very sad	Score
I never cough	0 1 2 3 4 5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0 1 2 3 4 5	My chest is completely full of phlegm (mucus)	
My chest does not feel tight at all	0 1 2 3 4 5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 1 2 3 4 5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 1 2 3 4 5	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	0 1 2 3 4 5	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 1 2 3 4 5	I don't sleep soundly because of my lung condition	
I have lots of energy	0 1 2 3 4 5	I have no energy at all	

Reference: Jones et al. ERJ 2009; 34 (3); 648-54.

TOTAL SCORE: ☐

CAT™ has been renamed as the Chronic Airways Assessment Test CAAT™; CAT™ and CAAT™ are equivalent and the scores are interchangeable.

2024 진료지침



귀하의 만성폐쇄성폐질환 (COPD)은 어떠십니까? 만성폐쇄성폐질환 (COPD) 평가 검사 (CAT)를 해주십시오.

다음 질문들은 귀하와 담당 의료진이 만성폐쇄성폐질환 (COPD)이 귀하의 육체적, 정신적 건강과 일상생활에 미치는 영향을 평가하기 위한 것입니다. 답안과 검사 점수는 만성폐쇄성폐질환 (COPD) 관리를 향상시키고 치료 효과를 최대화하는데 사용될 수 있습니다.

아래 각 항목마다 현재 귀하의 건강상태를 가장 잘 표현한 칸에 체크 표시 (√)를 해 주십시오.
질문에는 반드시 한 개의 답만 선택하셔야 합니다.

예: 나는 매우 행복하다 0 √ 2 3 4 5 나는 매우 슬프다

		점수
나는 전혀 기침을 하지 않는다	0 1 2 3 4 5 나는 항상 기침을 한다	
나는 가슴에 전혀 가래가 없다	0 1 2 3 4 5 나는 가슴에 가래가 가득 차 있다	
나는 전혀 가슴이 답답함을 느끼지 않는다	0 1 2 3 4 5 나는 가슴이 아주 답답함을 느낀다	
나는 언덕이나 계단을 오를 때 전혀 숨이 차지 않는다	0 1 2 3 4 5 나는 언덕이나 계단을 오를 때 아주 숨이 찬다	
나는 집에서 활동하는 데 전혀 제약을 받지 않는다	0 1 2 3 4 5 나는 집에서 활동하는데 많은 제약을 받는다	
폐질환에도 불구하고 나는 외출하는 데 자신이 있다	0 1 2 3 4 5 폐질환으로 인하여 나는 외출하는데 전혀 자신이 없다	
나는 잠을 깊이 잔다	0 1 2 3 4 5 폐질환으로 인하여 나는 잠을 깊이 자지 못한다	
나는 기운이 왕성하다	0 1 2 3 4 5 나는 전혀 기운이 없다	

총점

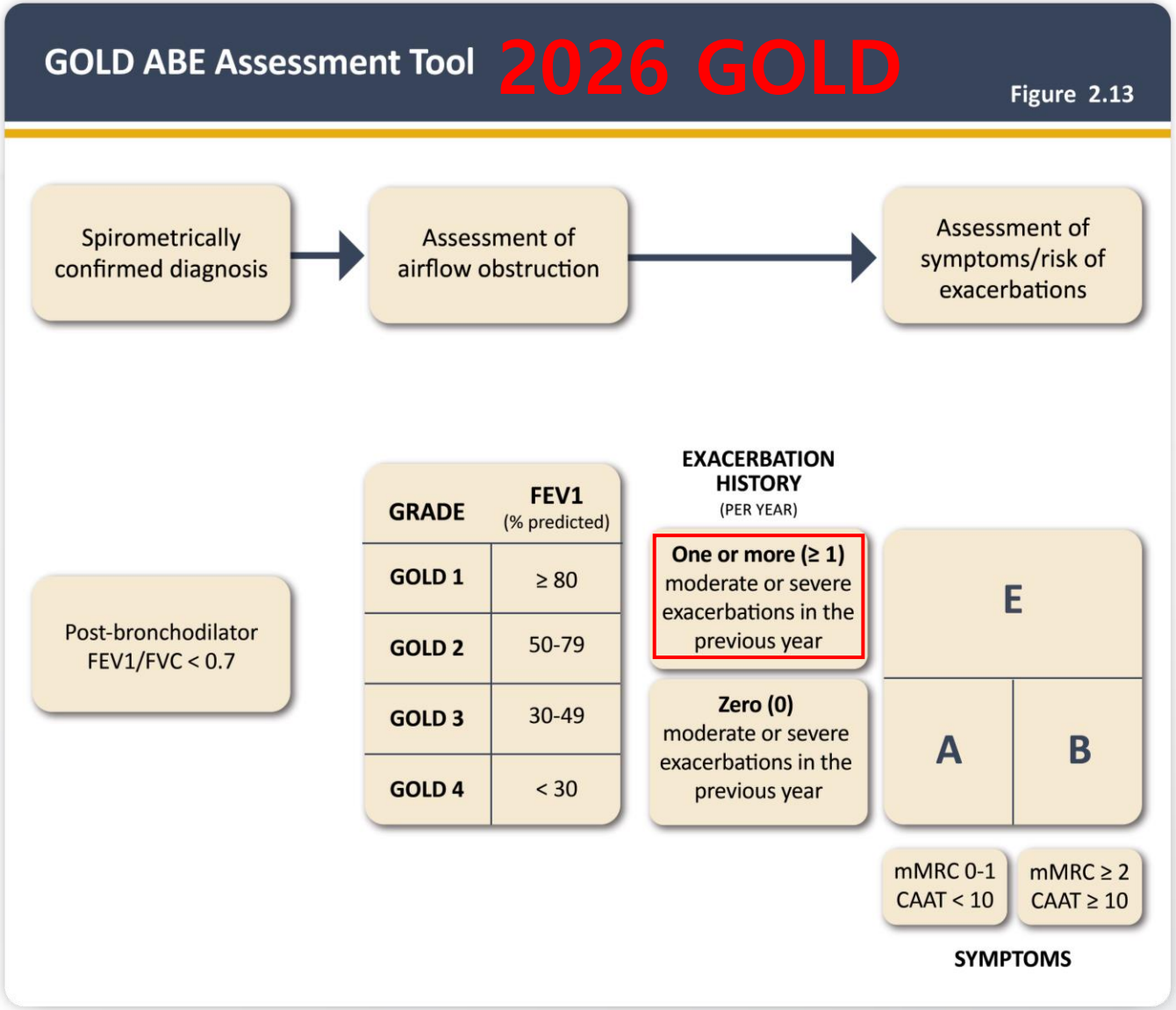
본 평가지는 환자분의 진료에 도움이 되고자 글락소스미스클라인에서 제작되었습니다.
진료 및 질환과 관련된 부분은 의사선생님과 상담해주십시오.

만성폐쇄성폐질환 (COPD) 평가 검사와 CAT 로고는 GlaxoSmithKline 그룹사의 등록상표입니다.

1202-STD-10-227-PA

그림 2-2. COPD 평가검사(COPD Assessment Test, CAT)

Assessment of COPD



Exacerbation history and blood eosinophil count prior to diagnosis of COPD and risk of subsequent exacerbations

David M.G. Halpin, Heath Healey, Derek Skinner, Victoria Carter, Rachel Pullen and David Price

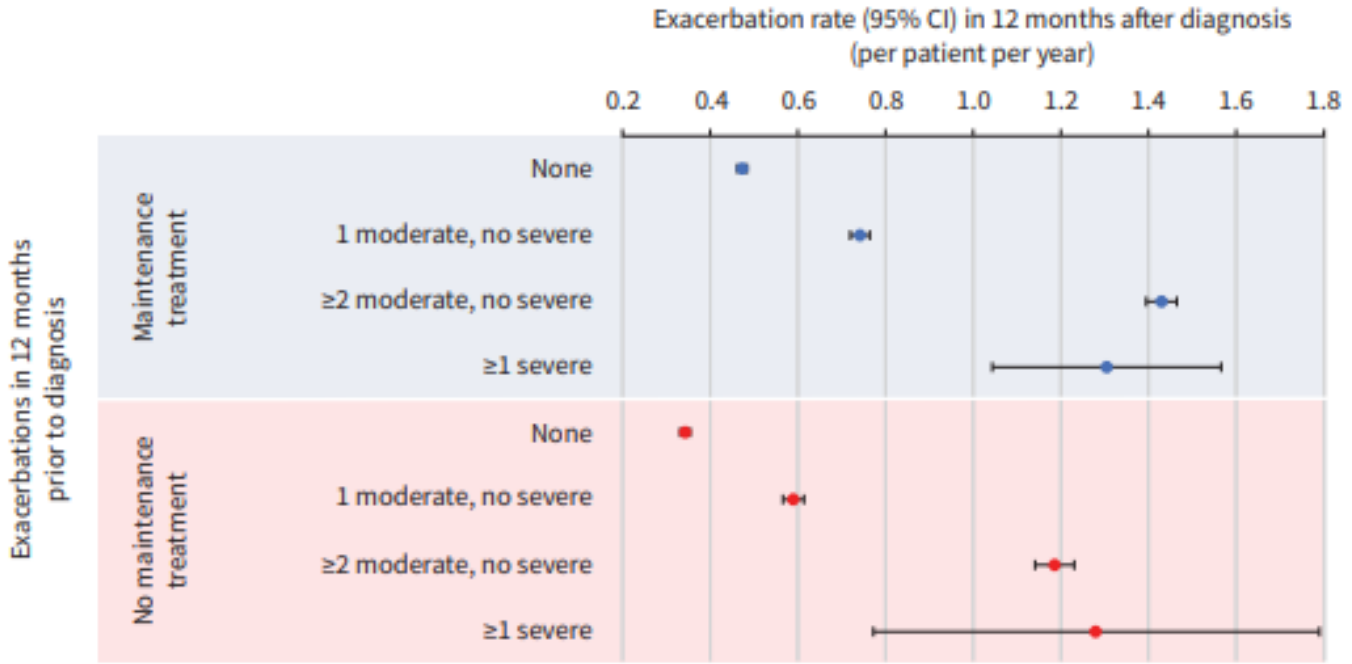


FIGURE 2 Rates of moderate or severe exacerbations in the 12 months after diagnosis with 95% confidence intervals, according to exacerbation history in the 12 months prior to diagnosis and whether maintenance therapy was started.

TABLE 2 Rate of moderate and severe exacerbations in the 12 months following diagnosis and incidence rate ratio (IRR) compared to patients with no prior exacerbations, in patients not started on maintenance therapy according to history of exacerbations in the 12 months prior to diagnosis and blood eosinophil count (BEC)

Exacerbation history in year prior to diagnosis	Patients (n)	Moderate or severe exacerbations in year following diagnosis	
None			
All	20 938	Rate	0.34 (0.33–0.35)
1 moderate, no severe			
All	6240	Rate	0.59 (0.57–0.61)
		IRR *versus* none	1.71 (1.66–1.76)
BEC <100×10^9 L^{-1}	161	Rate	0.50 (0.37–0.63)
		IRR *versus* none	1.46 (1.22–1.75)
BEC 100–300×10^9 L^{-1}	2388	Rate	0.56 (0.52–0.59)
		IRR *versus* none	1.62 (1.55–1.69)
BEC >300×10^9 L^{-1}	1795	Rate	0.67 (0.62–0.72)
		IRR *versus* none	1.95 (1.85–2.05)
≥2 moderate, no severe			
All	3878	Rate	1.19 (1.14–1.23)
		IRR *versus* none	3.44 (3.33–3.56)
BEC <100×10^9 L^{-1}	75	Rate	1.13 (0.79–1.48)
		IRR *versus* none	3.29 (2.63–4.2)
BEC 100–300×10^9 L^{-1}	1471	Rate	1.08 (1.01–1.15)
		IRR *versus* none	3.14 (2.98–3.32)
BEC >300×10^9 L^{-1}	1279	Rate	1.34 (1.26–1.43)
		IRR *versus* none	3.90 (3.69–4.13)
≥1 severe			
All	43	Rate	1.28 (0.77–1.79)
		IRR *versus* none	3.72 (2.76–5.01)
BEC <100×10^9 L^{-1}	1	Rate	NC
		IRR *versus* none	NC
BEC 100–300×10^9 L^{-1}	16	Rate	0.94 (0.06–1.81)
		IRR *versus* none	0.02 (0.01–0.03)
BEC >300×10^9 L^{-1}	15	Rate	1.13 (0.48–1.78)
		IRR *versus* none	2.92 (1.76–4.85)

95% confidence intervals are provided for rates and IRRs. NC: not calculable.

COPD 종합 평가

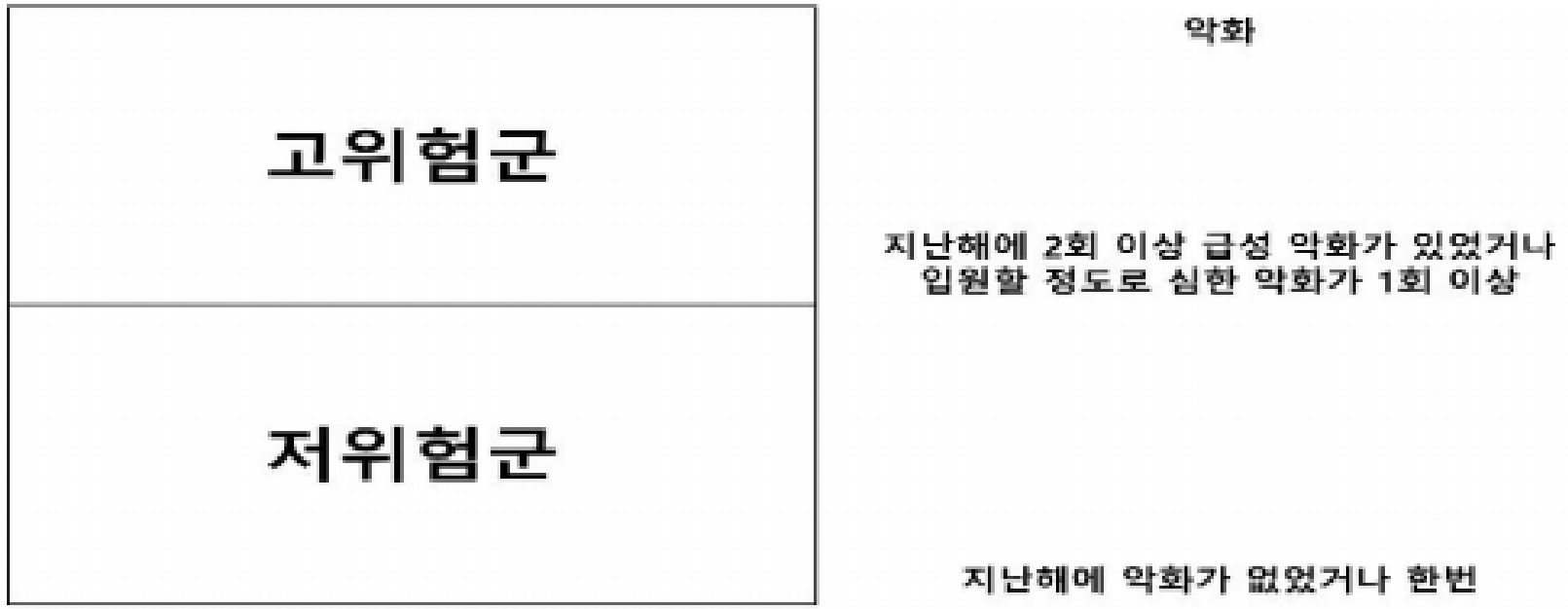


그림 2-3. COPD 종합평가

저위험군: 위험 낮음. 지난 해 악화가 없었거나 한 번인 경우이다.

고위험군: 위험 높음. 지난 해에 2회 이상 급성악화가 있었거나 입원할 정도로 심한 악화가 1회 이상 있었던 경우이다.

악화(=급성악화)는 항생제/전신스테로이드 약제를 추가해야 할 정도로 호흡기증상이 나빠진 급성상태를 의미한다.

Definition of Nosological Terms

Early COPD

- Propose to use the term "early COPD" only to discuss the "biological" first steps of the disease in an experimental setting.

Mild COPD

- Propose that "mild" should not be used to identify "early" COPD and used only to describe the severity of airflow obstruction measured spirometrically.

Young COPD

- Propose to consider " young COPD" in patients aged 20-50 years.
- Patients who had never achieved normal peak lung function in early adulthood and/or those with shorter plateau and/or early lung function decline.

Definition of Nosological Terms

Pre-COPD

- Individuals who have respiratory symptoms and/or other detectable structural and/or functional abnormalities, in the absence of airflow obstruction on forced spirometry.

PRISm (Preserved Ratio Impaired Spirometry)

- Individual with reserved ratio (FEV1/FVC ≥ 0.7, post BD), but impaired spirometry (FEV1 < 80, post BD).
- Prevalence of PRISm in population-based studies ranges from 7.1% to 11%

➡ **Pre-COPD** or **PRISm** are at risk of developing airflow obstruction over time.

Pre-COPD, GOLD 0, PRISm

표 2-5. COPD의 여러 개념들 비교

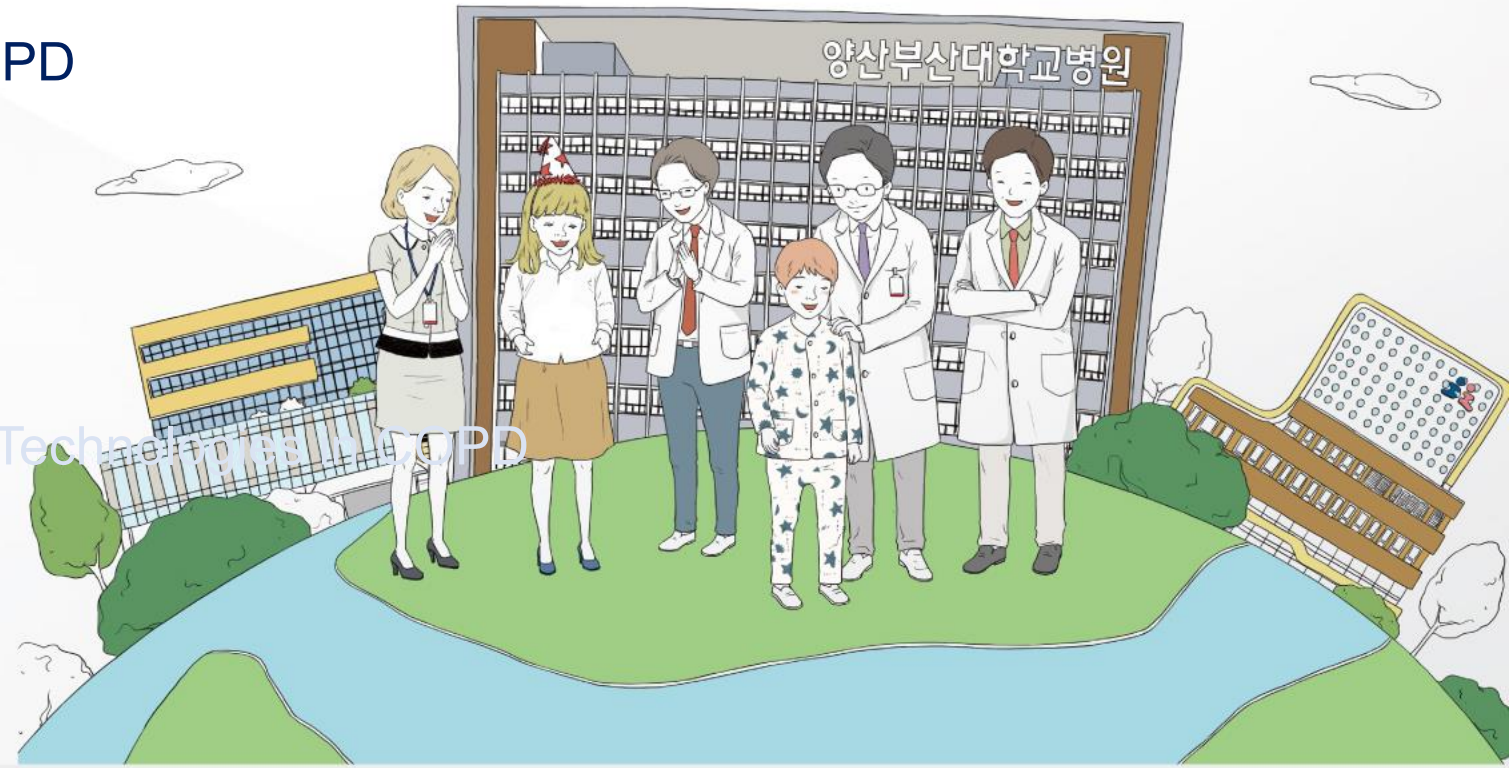
	Risk factors	Symptoms	FEV1/FVC < 0.7 or LLN	FEV1 ≥ 80%	Detectable structural/functional abnormalities	Biological early stage	Young age
COPD	Yes	Yes	Yes				
Mild COPD			Yes	Yes		Yes or no	
Gold stage 0 (at risk)	Yes	Yes	No				
Pre-COPD		Yes	No		Yes or no		
Early COPD			Yes	Yes or no		Yes	
PRISm			No	No			
Young COPD			Yes				Yes

천식 및 COPD의 중복증후군(Asthma COPD Overlap, ACO)

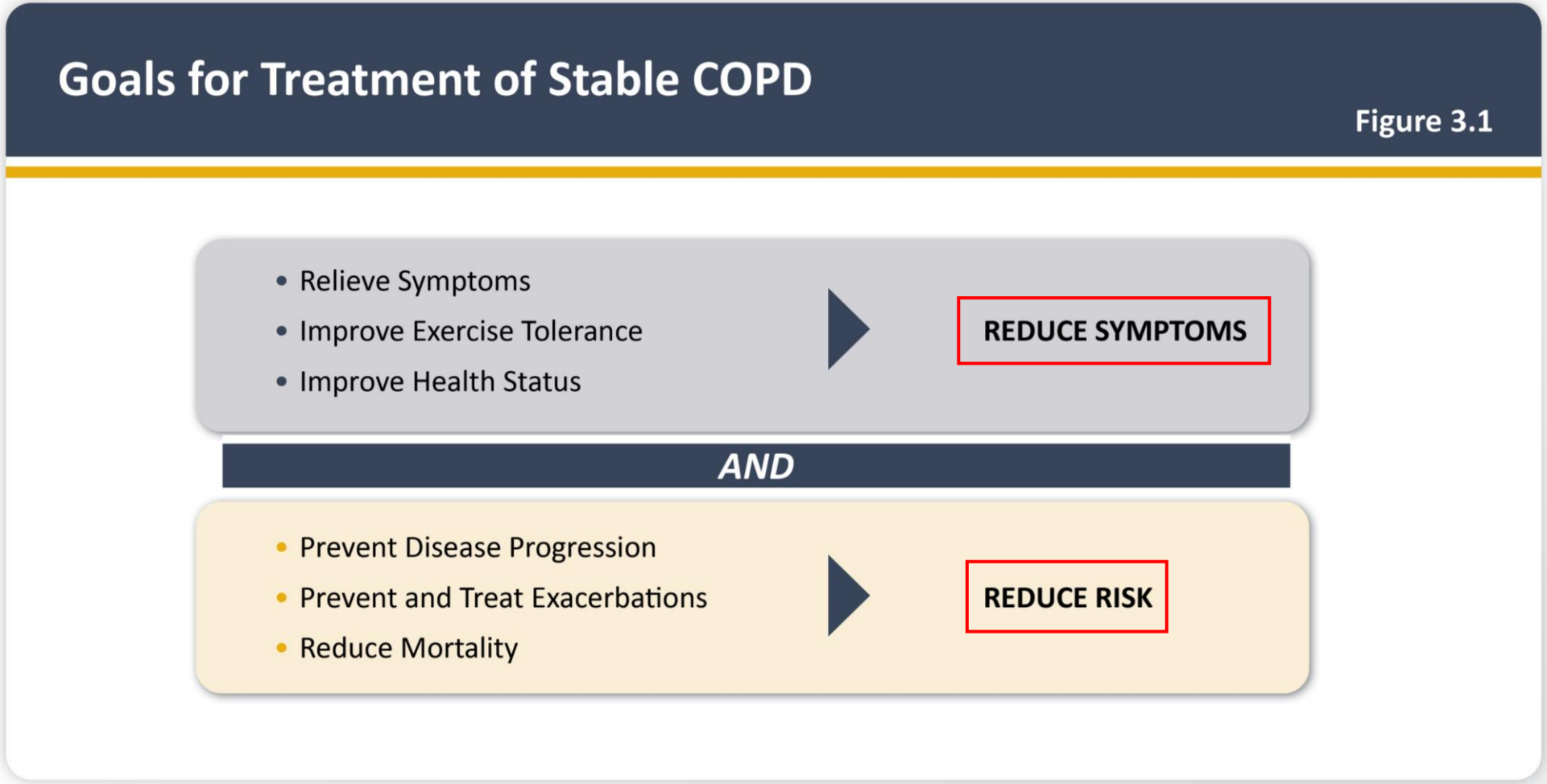
COPD와 천식은 각각 독특한 특징을 갖는 기도질환이지만, 한 환자에서 두가지 특징 모두가 나타날 수도 있다. 천식 및 COPD 중복증후군(ACO, asthma-COPD overlap syndrome)은 이처럼 천식의 특징인 알레르기 감작, 기도 과민성, 가역성 기류제한과 COPD의 특징인 흡연력, 폐기종, 지속적인 기류제한을 모두 갖는 경우를 일컫는다[231, 232]. 2014년 GINA와 GOLD가 ACO 진단 및 초치료 전략에 대한 공동 가이드라인을 발표했으나 2020년 GOLD 부터는 ACO를 별도로 다루지 않고 있다. 대신, 천식과 COPD가 각기 다른 임상적인 특징을 갖는 질환이며 호산구 증가증과 기도가역성 등 일부 임상적인 특징들을 공유할 수 있는 것으로 보고 있다.

Contents

양산부산대학교병원
Pusan National University Yangsan Hospital



Goals for Treatment of COPD



Disease Activity

- **Disease activity** refers to biological pathways that
  - ① cause the **pathological outcomes** of disease, and
  - ② are **potentially reversible or controllable** with treatment
  - If untreated or treatment is ineffective, disease activity leads to
    - disease progression
    - permanent organ damage and dysfunction

- Indicators
  - Biomarker: blood eosinophil counts (Type 2 inflammation)
  - Clinical feature: Exacerbations, Worsening respiratory symptoms, Accelerated lung function decline, Radiologic progression of emphysema

Disease Activity

- **A key objective of COPD management** is to **reduce disease activity**, with the aim that patients have:
  - ✓no exacerbations
  - ✓no worsening of symptoms
  - ✓no accelerated loss of lung function

- Clinical states
  - **disease stability** – a low disease activity state with no exacerbations, no worsening of symptoms and no accelerated loss of lung function
  - **disease control** – a state of low disease activity, defined by no exacerbations and no worsening of symptoms, plus low impact on the patient defined as symptoms below a threshold value

Is Disease Stability an Attainable Chronic Obstructive Pulmonary Disease Treatment Goal?

Dave Singh[1], MeiLan K. Han[2], Surya P. Bhatt[3], Marc Miravitlles[4], Chris Compton[5], Stefanie Kolterer[6], Tharishini Mohan[5], Suneal K. Sreedharan[5], Lee Tombs[7], and David M. G. Halpin[8]

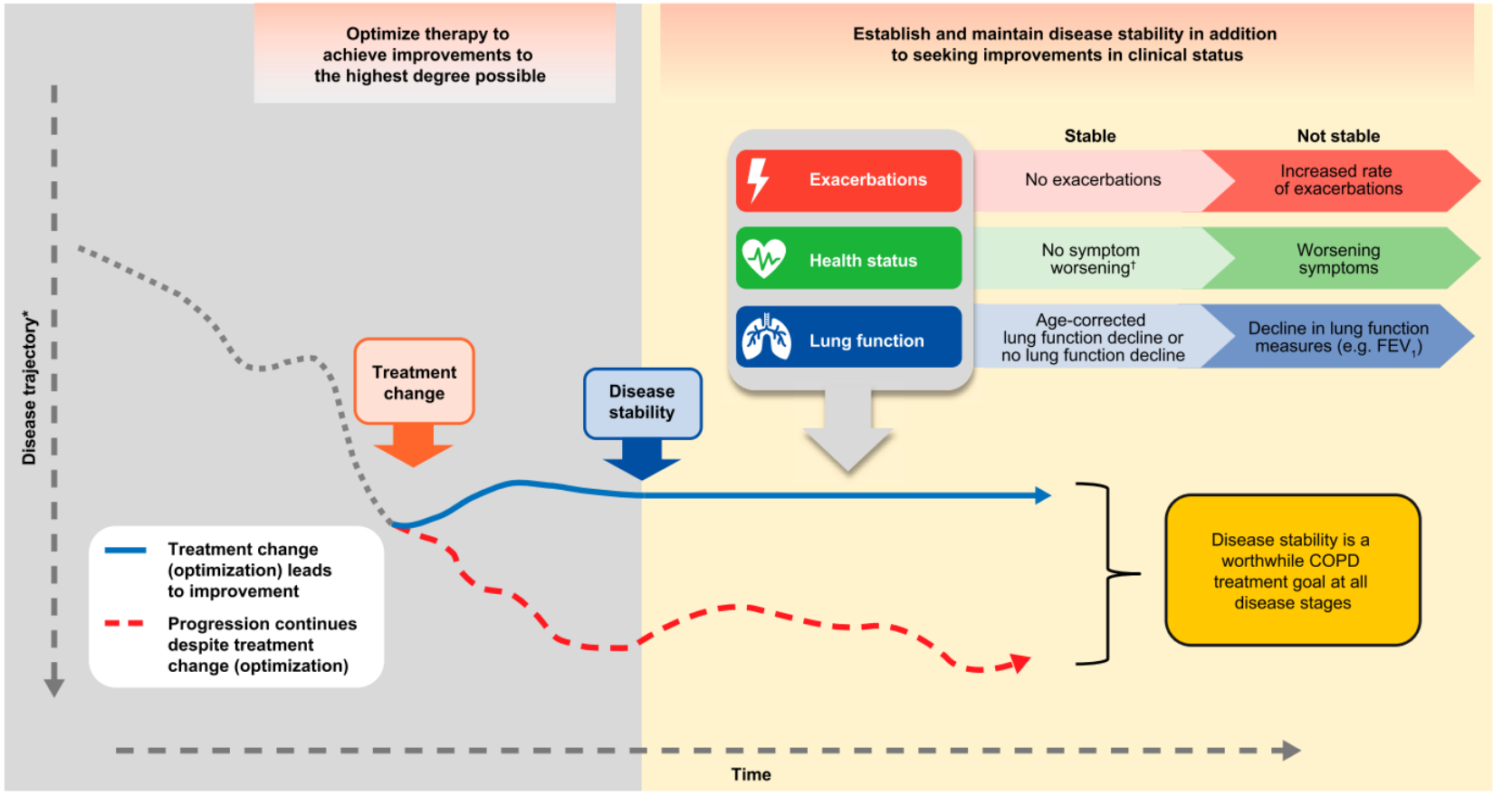


Table 2. Preliminary Definition for Disease Stability

Components	Exacerbations: Frequency	Health Status: SGRQ or CAT	Lung Function: FEV_1
Thresholds*	No exacerbations	No worsening in SGRQ or CAT score; alternatively, no clinically significant worsening	No decrease; consideration of correction for age-related decline
Timeline	• 6–12 months, comprising one or multiple visits in that time • Benchmark current measurements against previous 6–12 months at each visit		
Individual vs. composite assessments	• Stability can be achieved in one or multiple components • Dependent on patient factors, availability of spirometry, and setting		
Context and setting	• Primary care or in-clinic and research settings • All disease severities, phenotypes/etiotypes, and interventions		
Other considerations	• "Clinically significant" worsening will require definition • Biomarkers may be implemented in future components once validated • An expert consensus on the definition of disease stability should be reached among key experts		

Definition of abbreviations: CAT = COPD Assessment Test; COPD = chronic obstructive pulmonary disease; SGRQ = St. George's Respiratory Questionnaire.
*Some patients may experience improvements with treatment optimization and other holistic interventions (e.g., smoking cessation, vaccination); this is also considered to be achieving disease stability.

ARTICLE IN PRESS

[COPD Original Research]

CHEST

Clinical Outcomes in Patients With COPD With Disease Stability

Data from the Korea COPD Subgroup Study Cohort

Eunjeong Son, MD, PhD; Hyewon Seo, MD, PhD; Seung Won Ra, MD, PhD; Seoung Ju Park, MD, PhD; Soo-Jung Um, MD, PhD; Seong Yong Lim, MD, PhD; Hyoung Kyu Yoon, MD, PhD; Kwang Ha Yoo, MD, PhD; Joon Young Choi, MD, PhD; and Chin Kook Rhee, MD, PhD

TABLE 3] Cox Proportional Hazards Regression of All-Cause Mortality According to Disease Stability

	Crude			Multivariate		
	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Disease stability	0.56	0.37-1.09	.096	0.56	0.32-0.96	.036
Age	1.07	1.07-1.11	< .001	1.07	1.05-1.09	< .001
Female sex	0.71	0.34-0.90	.018	0.73	0.32-1.66	.457
BMI	0.87	0.87-0.93	< .001	0.87	0.83-0.91	< .001
Smoking status						
Never		(Reference)			(Reference)	
Prior	1.74	1.12-2.70	.014	1.51	0.73-3.10	.267
Current	1.98	1.25-3.15	.004	2.16	1.02-4.57	.045
HTN	1.27	1.02-1.58	.036	1.49	1.12-2.00	.007
HF	1.78	1.08-2.94	.025	0.70	0.26-1.90	.481
DM	1.00	0.75-1.33	.986			
MI	1.31	0.81-2.10	.269			
CVA	1.27	0.56-2.87	.572			

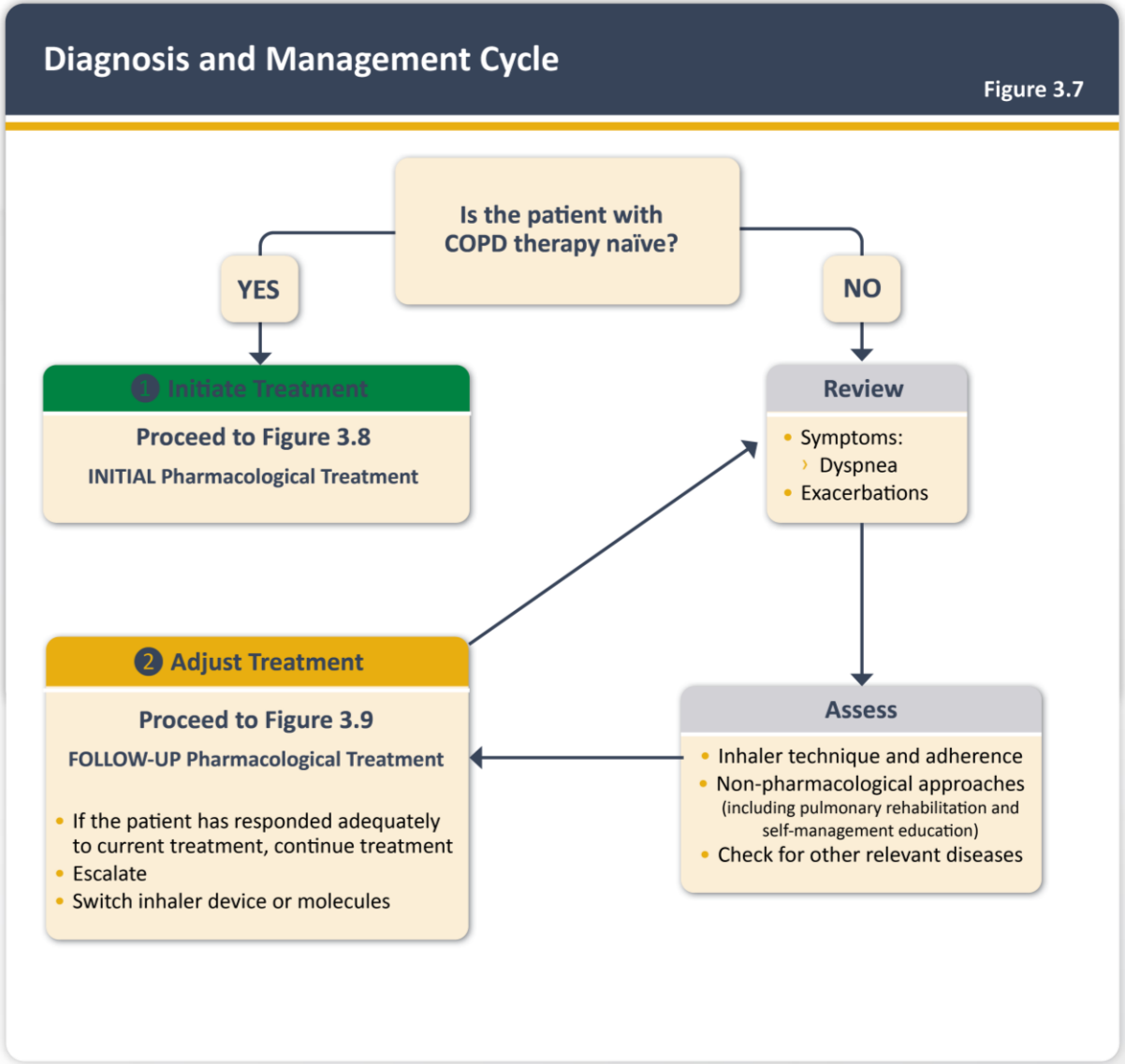
CVA = cerebrovascular accident; DM = diabetes mellitus; HF = heart failure; HR = hazard ratio; HTN = hypertension; MI = myocardial infarction.

TABLE 2] Comparison of Exacerbation Frequency According to the Presence of Disease Stability

Exacerbations	IRR	95% CI	*P* Value
Moderate-to-severe	0.30	0.20-0.43	.033
Severe	0.26	0.10-0.58	.002

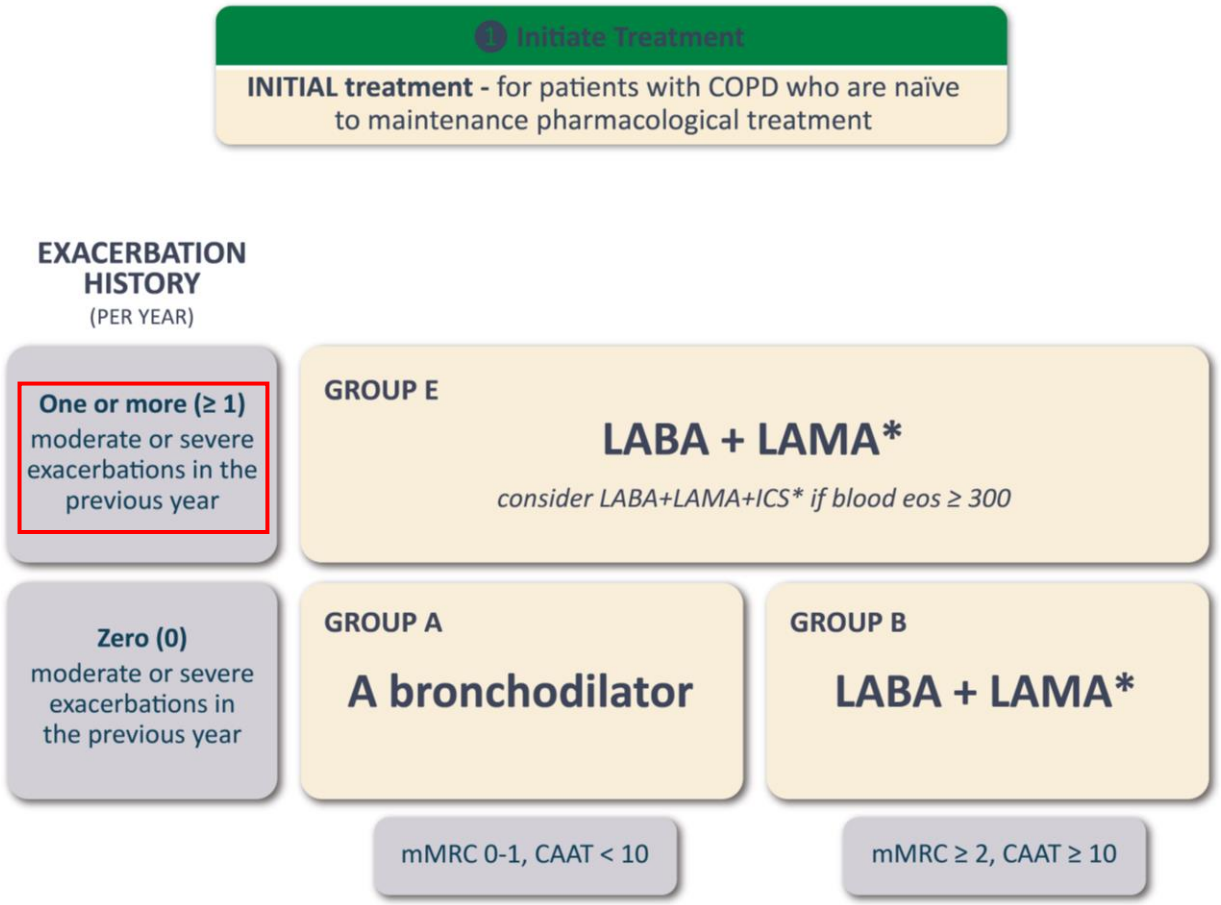
Adjusted variables include age, sex, BMI, smoking status, and post-bronchodilator FEV_1 (L). IRR = incident rate ratio.

Management of COPD



Initial Pharmacological Treatment

Figure 3.8



*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

Exacerbations refers to the number of exacerbations per year; eos: blood eosinophil count in cells per microliter; mMRC: modified Medical Research Council dyspnea questionnaire; CAAT™: Chronic Airways Assessment Test™.

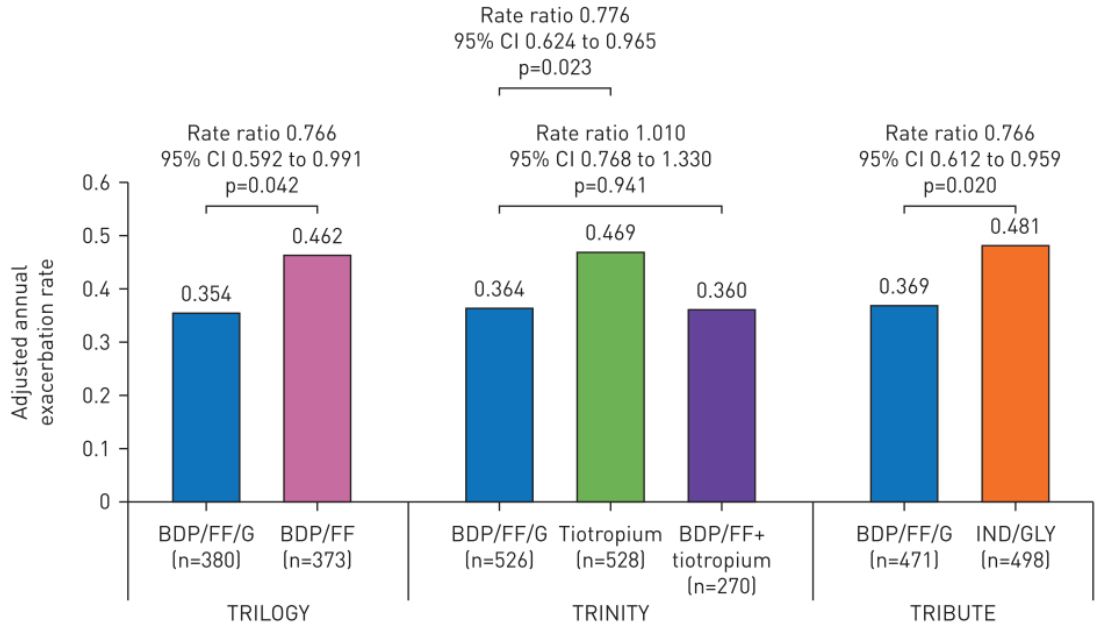
Extrafine triple therapy in patients with symptomatic COPD and history of one moderate exacerbation

Study Design
- Post hoc analysis of three 52-week RCT
- TRILOGY, TRINITY, and TRIBUTE

Study Population
- Symptomatic COPD (CAT ≥10)
- Post BD FEV_1 <50% predicted
- One moderate to severe exacerbation in the previous year

Treatment Comparison
- BDP/FF/G vs. ICS/LABA, LAMA, LABA/LAMA

a)



b)

	TRILOGY	TRINITY		TRIBUTE
	BDP/FF/G (n=380) *versus* BDP/FF (n=373)	BDP/FF/G (n=526) *versus* Tiotropium (n=528)	BDP/FF/G (n=526) *versus* BDP/FF + tiotropium (n=270)	BDP/FF/G (n=471) *versus* IND/GLY (n=498)
Week 52 SGRQ total score				
Mean	−3.97 (−5.92 to −2.02) p<0.001	−1.43 (−3.12 to 0.26) p=0.098	1.64 (−0.39 to 3.68) p=0.114	−2.14 (−3.63 to −0.65) p=0.005
Responders	1.54 (1.14 to 2.09) p=0.006	1.22 (0.94 to 1.58) p=0.133	0.92 (0.67 to 1.26) p=0.604	1.38 (1.05 to 1.80) p=0.020
Overall mean SGRQ total score	−2.91 (−4.29 to −1.52) p<0.001	−1.86 (−3.10 to −0.62) p=0.003	0.51 (−1.00 to 2.01) p=0.509	−2.16 (−3.23 to 1.08) p<0.001
Week 52 pre-dose morning FEV_1 mL	83 (42 to 123) p<0.001	52 (16 to 88) p=0.005	−16 (−59 to 27) p=0.470	25 (−5 to 55) p=0.103
Overall pre-dose morning FEV_1 mL	93 (62 to 124) p<0.001	41 (13 to 68) p=0.003	−26 (−58 to 7) p=0.128	28 (6 to 51) p=0.014

Singh et al. Eur Respir J. 2019 May 18;53(5):1900235.

Follow-up Pharmacological Treatment

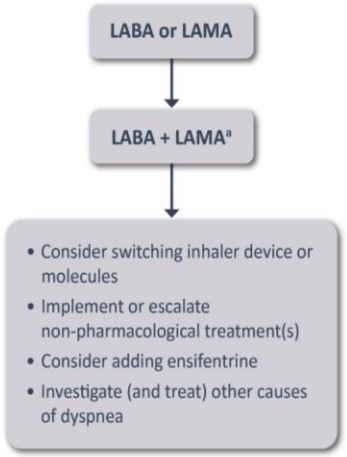
Figure 3.9

2 Adjust Treatment

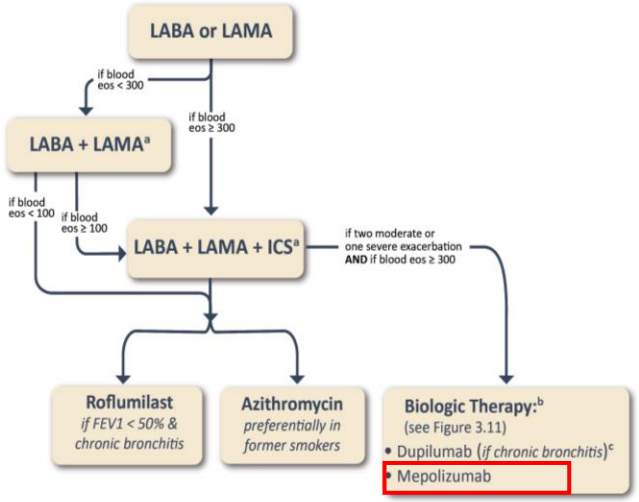
CONTINUE CURRENT TREATMENT

unless dyspnea or exacerbation(s) require optimization

• IF PERSISTENT DYSPNEA



• IF ONE OR MORE MODERATE OR SEVERE EXACERBATION



[a]Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment.

[b]Listed in order of approval in the US.

[c]Patient-reported history of chronic bronchitis (chronic productive cough) for 3 months in the year up to screening, absent other known causes.

Consider de-escalation of ICS if pneumonia or other considerable side-effects. In case of blood eosinophils ≥ 300 cells/μl de-escalation is more likely to be associated with the development of exacerbations.

The NEW ENGLAND JOURNAL of MEDICINE

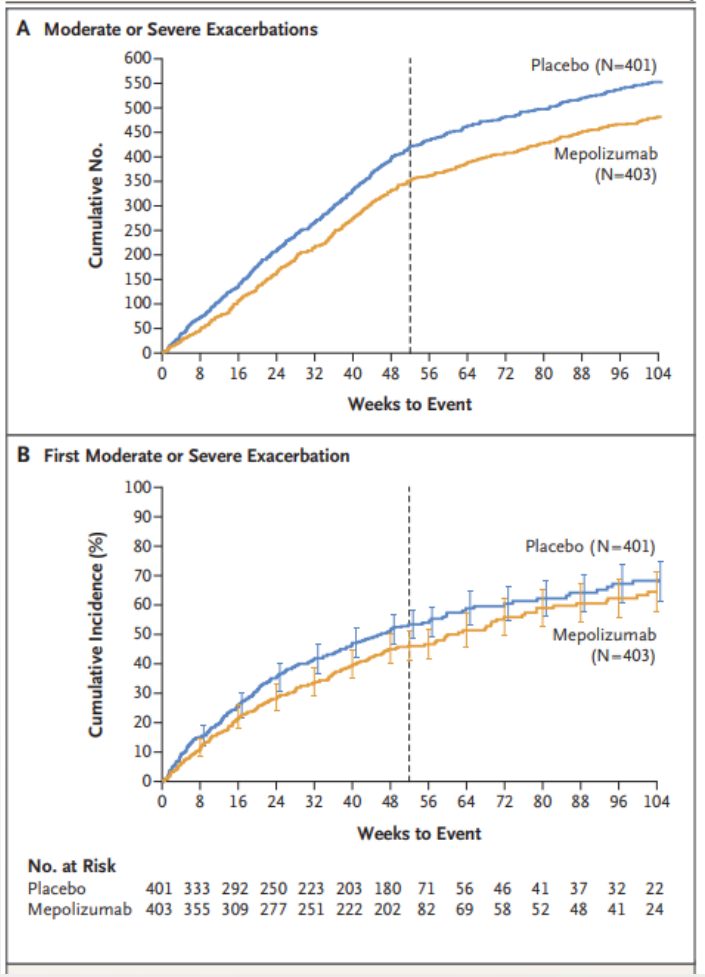
ORIGINAL ARTICLE

Mepolizumab to Prevent Exacerbations of COPD with an Eosinophilic Phenotype

F.C. Sciurba,[1] G.J. Criner,[2] S.A. Christenson,[3] F.J. Martinez,[4] A. Papi,[5] N. Roche,[6] J. Bourbeau,[7] S. Korn,[8] M. Bafadhel,[9] M.L.K. Han,[10] S. Kolterer,[11] K. Miller,[12] D. Mouneimne,[13] J. Fletcher,[13] B. Mayer,[14] J. Min,[15] and I.D. Pavord,[16] for the MATINEE Study Investigators*

Table 2. Primary and Secondary Efficacy End Points.*

End Point	Mepolizumab (N=403)	Placebo (N=401)
Primary end point		
Annualized rate of moderate or severe exacerbations (95% CI) — events/yr	0.80 (0.70–0.91)	1.01 (0.89–1.15)
Rate ratio vs. placebo (95% CI)	0.79 (0.66–0.94)	—
P value	0.01	—



Study Design

- Phase 3, randomized, double-blind, placebo-controlled trial

Study Population

- Patients with COPD
  - History of exacerbations
  - Blood eosinophil count ≥300 cells/μL
  - Receiving triple therapy

Intervention

- 1:1 ratio, to receive mepolizumab (100 mg, SC) or placebo every 4 weeks for 52 to 104 weeks.

Primary Endpoint

- Annualized rate of moderate or severe COPD exacerbations

Evidence Supporting Use of Biologics in the Treatment of COPD

Figure 3.11

Molecule/RCT*	Key inclusion criteria[a]	Annualized rate of moderate/severe exacerbations	Lung function improvement (pre-BD FEV1)[d]	Quality of life improvement (SGRQ)
Dupilumab (300 mg/2 weeks)				
BOREAS[1] (n=939)	FEV1 post-BD 30-70% chronic bronchitis[b] eos ≥ 300 (screen)	RR 0.70; P < 0.001	83mL; P < 0.001 (95% CI: 42, 125)	-3.4; P = 0.002 (95% CI: -5.5, -1.3)
NOTUS[2] (n=935)	FEV1 post-BD 30-70% chronic bronchitis[b] eos ≥ 300 (screen)	RR 0.66; P < 0.001	62mL; P = 0.02 (95% CI: 11, 113)	-3.4[e] (95% CI: -5.8, -0.9)
Mepolizumab (100 mg/4 weeks)				
METREO[3] (n=674)	FEV1 post-BD 20-80% eos ≥ 150 (screen) or eos ≥ 300 (previous year)	RR 0.80; NS	19mL; NS (95% CI: -29, 67)	-1.8; NS (95% CI: -4.5, 0.8)
METREX[3] (n=836)	FEV1 post-BD 20-80% eos ≥ 150 (screen) or eos ≥ 300 (previous year)[c]	RR 0.82; P = 0.04	-10mL; NS (95% CI: -54, 33)	0.2; NS (95% CI: -2.8, 3.2)
MATINEE[4] (n=804)	FEV1 post-BD 20-80% eos ≥ 300 (screen) and eos ≥ 150 (previous year)	RR 0.79; P = 0.01	-9.0mL; NS (95% CI: -60.1, 42.1)	-2.3; NS (95% CI: -4.6, 0.1)

*Molecules are listed in order of approval in the US.

These results cannot be directly compared across trials as there were different patient populations included.

a: all studies recruited patients with exacerbations in the previous year while receiving inhaled triple therapy
b: patient-reported history of chronic bronchitis (chronic productive cough) for 3 months in the year up to screening, absent other known causes
c: pre-defined eosinophilic population
d: at 52 weeks
e: significance not tested according to hierarchical testing procedure

NS: not statistically significant; eos: blood eosinophils (cells/μL); SGRQ: St George's Respiratory Questionnaire; BD: bronchodilator; RR: risk ratio.

References: [1]Bhatt et al. N Engl J Med 2023;389:205-214; [2]Bhatt et al. N Engl J Med 2024;390:2274-2283; [3]Pavord et al. N Engl J Med 2017;377:1613-1629; [4]Sciurba et al. N Engl J Med 2025;392:1710-1720; .

COPD의 초기 약물치료

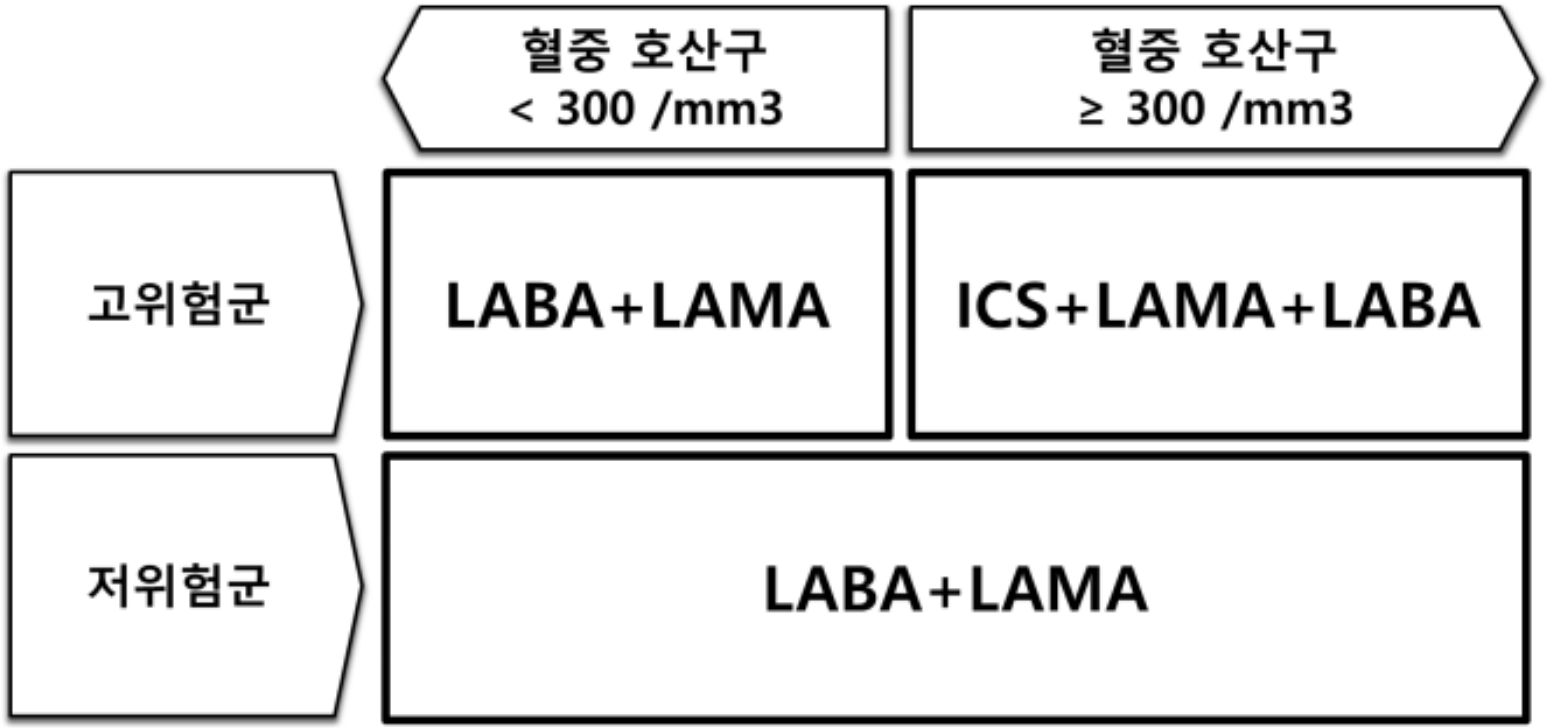


그림 3-3. 안정 시 COPD의 초기 약물 치료

✓ 저위험군: 지난 1년 동안 급성악화가 1회 이하이면서 입원할 정도로 심한 악화가 없었던 환자
✓ 고위험군: 지난 1년 동안 급성악화가 2회 이상 있었거나 입원할 정도로 심한 악화가 있었던 환자

악화 후 COPD의 후속 약물치료

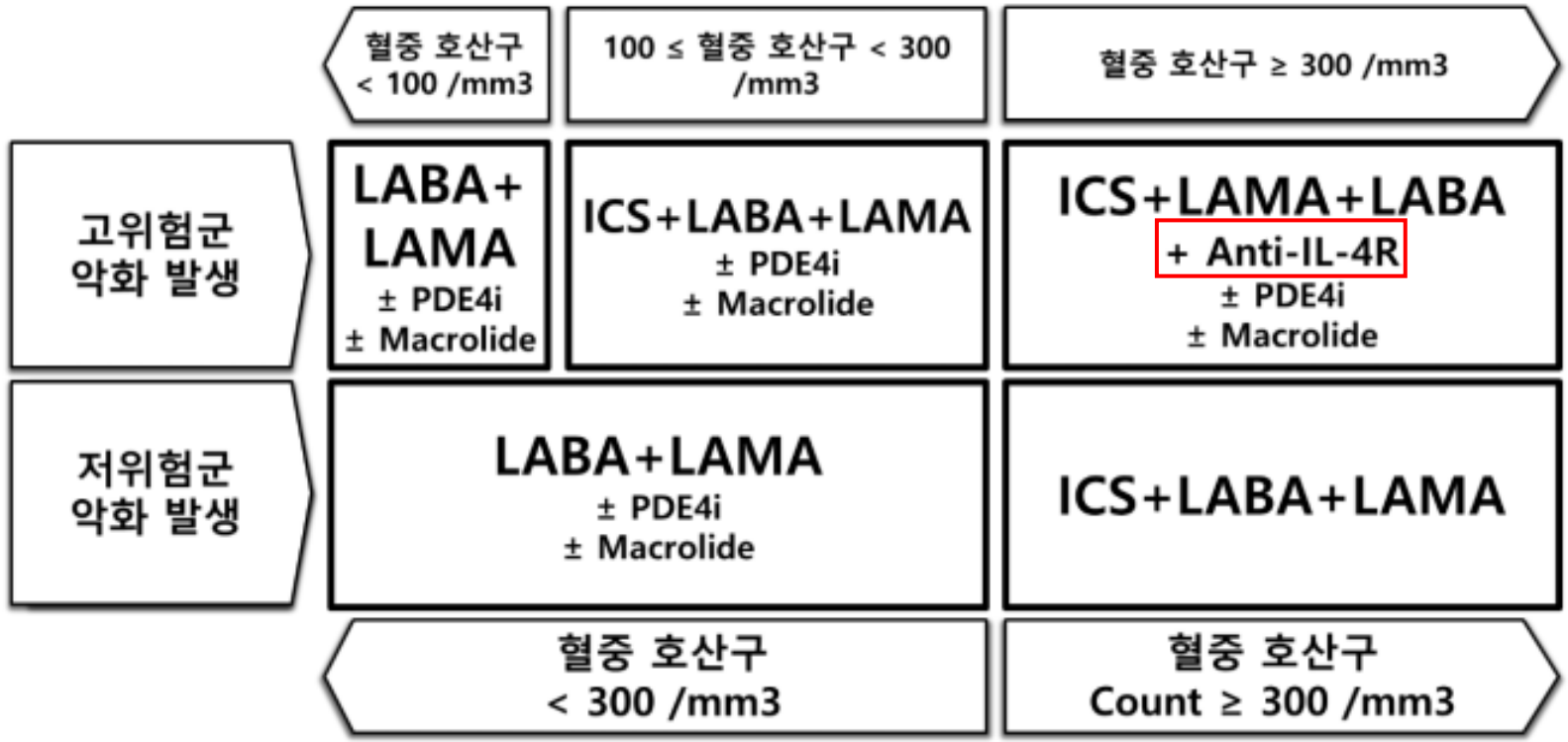


그림 3-4. 악화 후 COPD의 후속 약물 치료

LABA=long-acting beta2-agonist, LAMA=long-acting muscarinic antagonist, ICS=inhaled corticosteroid, PDE4I=phosphodiesterase 4 inhibitor, IL-4R=interleukin 4 receptor

Reference: 2024 COPD 진료지침

COPD의 경구약제

1. PDE4 억제제(Roflumilast)
   - 기전: cAMP 분해 억제 → 항염증 효과
   - 보험기준 (만성기관지염을 수반한 중증의 COPD + 급성악화 병력)

     ① FEV_1 < 50% 예측치

     ② 지속적 흡입치료(LABA/LAMA)에도 연 2회 이상 악화
   - 부작용: 설사, 구역 (주로 초기 발생)

2. Macrolide
   - 용법: Azithromycin 250 mg/일 또는 500 mg/일 주 3회 (1년간)

     또는 erythromycin 500 mg × 2/일
   - 효과: COPD 급성악화 위험 감소
   - 부작용: 항생제 내성, QT 연장, 청력 이상

Factor to Consider when initiating ICS

2026 GOLD

Factors to Consider when Initiating ICS Treatment

Figure 3.10

Factors to consider when adding ICS to long-acting bronchodilators:

(note the scenario is different when considering ICS withdrawal)

STRONGLY FAVORS USE	History of hospitalization(s) for exacerbations of COPD[#]
	≥ 2 moderate exacerbations of COPD per year[#]
	Blood eosinophils ≥ 300 cells/μL
	History of, or concomitant asthma
FAVORS USE	1 moderate exacerbation of COPD per year[#]
	Blood eosinophils 100 to < 300 cells/μL
AGAINST USE	Repeated pneumonia events
	Blood eosinophils < 100 cells/μL
	History of mycobacterial infection

[#]despite appropriate long-acting bronchodilator maintenance therapy (see Figures 3.8 & A3.1 for recommendations); *note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut-points; eosinophil counts are likely to fluctuate.

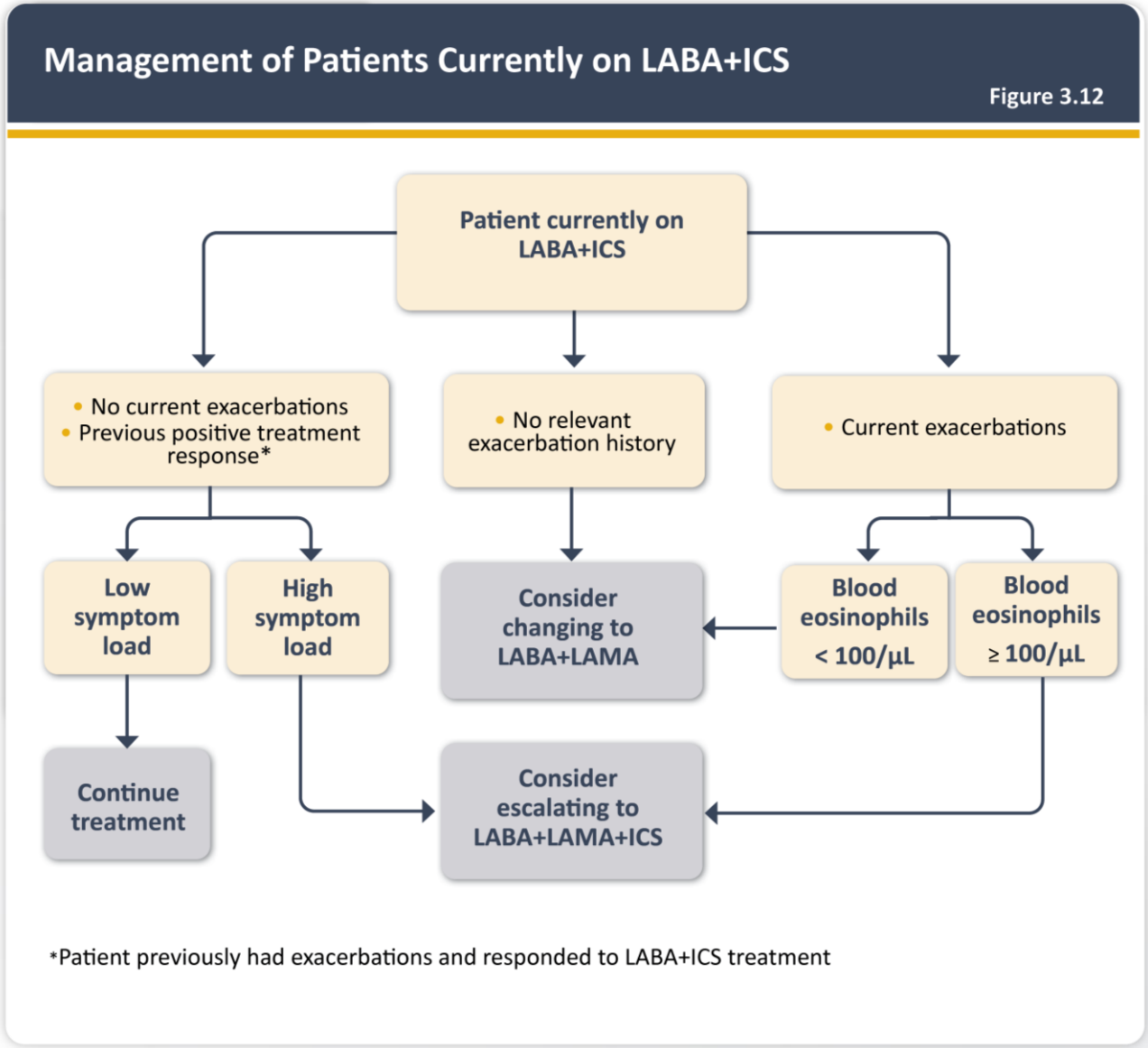
2024 진료지침

그림 3-2. ICS를 지속기관지확장제에 추가할 때 고려해야할 요인들 (ICS 중단을 고려할 때와는 다름)

강하게 사용 권고	COPD 급성 악화로 입원한 병력[#]
	중등도의 COPD 급성 악화가 연간 2회 이상[#]
	혈액 호산구 수치 ≥300 개/μL
	천식이 동반된 경우
사용 고려	중등도의 COPD 급성 악화가 연간 1회 이상[#]
	혈액 호산구 수치 ≥100 & <300 개/μL
사용하지 않을 것을 권고	반복적인 폐렴 발생
	혈액 호산구 수치 <100 개/μL
	마이코박테리아 감염의 과거력

적절한 지속성기관지확장제 유지요법에도 조절이 안되는 경우

Management of patients on LABA+ICS



Non-Pharmacological Management

Non-Pharmacological Management of COPD*

Figure 3.15

Patient Group	Essential	Recommended	Depending on Local Guidelines
A	Smoking cessation (can include pharmacological treatment)	Physical activity	Influenza vaccination COVID-19 vaccinations Pneumococcal vaccination Pertussis vaccination Shingles vaccination RSV vaccination
B and E	Smoking cessation (can include pharmacological treatment) Pulmonary rehabilitation	Physical activity	Influenza vaccination COVID-19 vaccinations Pneumococcal vaccination Pertussis vaccination Shingles vaccination RSV vaccination

*Can include pharmacological treatment

Follow-up of Non-Pharmacological Treatment

Figure 3.16

1. If response to initial treatment is appropriate, maintain it and offer:

- Influenza vaccination every year and other recommended vaccinations according to guidelines
- Self-management education
- Assessment of behavioral risk factors such as smoking cessation (if applicable) and environmental exposures

Ensure

- Maintenance of exercise program and physical activity
- Adequate sleep and a healthy diet

2. If not, consider the predominant treatable trait to target

DYSPNEA

- Self-management education (written action plan) with integrated self-management regarding:
  - Breathlessness, energy conservation techniques, and stress management strategies
- Pulmonary rehabilitation (PR) program and/or maintenance exercise program post PR

EXACERBATIONS

- Self-management education (written action plan) that is personalized with respect to:
  - Avoidance of aggravating factors
  - How to monitor/manage worsening of symptoms
  - Contact information in the event of an exacerbation
- Pulmonary rehabilitation (PR) program and/or maintenance exercise program post PR

All patients with advanced COPD should be considered for end of life and palliative care support to optimize symptom control and allow patients and their families to make informed choices about future management.

비약물적 치료

비약물적 치료

표 3-4. 환자 교육 프로그램 주제

금연
위험요소 감소에 대한 정보 및 충고
COPD에 대한 정보
흡입치료제 사용법 및 다른 치료에 대한 설명
급성 악화 조기 인지 및 치료 결정호흡곤란 감소시키는 방법
합병증에 대한 정보
산소 치료에 대한 정보
사전 의료 의향 및 임종시의 결정

표 3-5. 호흡재활 치료의 효과

운동능력 향상
호흡곤란 감소
건강과 관련된 삶의 질 향상
병원 입원 횟수와 입원기간 감소
COPD와 관련된 불안과 우울증 감소
상지근력과 지구력 훈련으로 상지기능 호전
재활치료의 효과가 치료 후에도 지속
생존율 증가
일반적인 운동훈련과 병행하였을 때 호흡근육 훈련이 효과적
급성악화로 입원 후 회복을 향상
지속성베타2-작용제 효과증대

Vaccination for COPD

Vaccination for People with COPD

Figure 3.6

People with COPD should receive all recommended vaccinations in line with the relevant local guidelines:

- Yearly influenza vaccination **(Evidence B)**
- SARS-CoV-2 (COVID-19) vaccination based on WHO and CDC updated recommendations **(Evidence B)**
- We recommend either one dose of 21-valent pneumococcal conjugate vaccine (PCV21) or one dose PCV20 **(Evidence B)**. Pneumococcal vaccination has been shown to reduce the incidence of community-acquired pneumonia and exacerbations for people with COPD **(Evidence B)**
- Respiratory syncytial virus (RSV) vaccination for individuals aged ≥ 50 years and/or with chronic heart or lung disease, as recommended by the CDC **(Evidence A)**
- Tdap (dTaP/dTPa) vaccination to protect against pertussis (whooping cough), in addition to tetanus and diphtheria, for people with COPD that were not vaccinated in adolescence, as recommended by the CDC **(Evidence B)**
- Zoster vaccine to protect against shingles for people with COPD aged > 50 years, as recommended by the CDC **(Evidence B)**

- In a report from the UK, RSV was associated with 8.7% of outpatient managed exacerbations.
- RSV is expected to benefit patients with COPD

Vaccination for COPD in Korea

- 인플루엔자 폐렴구균 백신은 모든 COPD 환자에게 접종해야 한다.
- 65세 이상의 모든 COPD 환자에게 폐렴구균 백신 접종을 권장한다.
- 모든 COPD환자에서 COVID-19 백신 접종을 권장한다.
- 10년간 백일해의 낮은 추정발생률과 백신의 예방효과를 종합해 보면, 모든 COPD환자에게 백일해 백신 접종 권고는 논의가 필요하다.
- RSV 백신은 비교적 최근에 개발되어 주로 고령의 대상자에서 RSV 관련 질환 예방에 효과를 보였다. 해외에서는 75세 이상 노인이나 면역 저하 또는 만성 심장/폐 질환을 가진 60세 이상에서 접종이 권고되고 있다. 국내의 권고 사항은 아직 미정이나 고령 또는 고위험군을 중심으로 접근할 필요가 있다.
- 대상포진 백신은 50세 이상 성인에게 권고되고 있으며 COPD 환자도 이에 따라 접종이 권고된다.

Contents

양산부산대학교병원
Pusan National University Yangsan Hospital

Conditions That may mimic AE like Symptom

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Conditions That May Mimic or Worsen Exacerbation-like Symptoms

Figure 4.3

Tools available to address potential confounders:

Most frequent	**Acute viral or bacterial bronchitis** • Viral and bacterial microbiological assessment • Chest X-ray
	Heart failure • Chest X-ray or chest CT scan • NT pro-brain natriuretic peptide (NT proBNP) and BNP • Cardiac ultrasound
	Myocardial infarction and/or cardiac arrhythmias (atrial flutter/fibrillation) • Electrocardiography • Troponin
	Pulmonary embolism • Clinical probability assessment (hemoptysis, deep vein thrombosis, history of cancer, surgery, bone fracture) • D-dimer • CT angiography for pulmonary embolism
	Pneumonia • Viral and bacterial microbiological assessment • Chest X-ray or chest CT scan • Lung ultrasound
Less frequent	**Pneumothorax** • Chest X-ray or chest CT scan • Thoracic ultrasound

2024 진료지침

표 5-1. COPD 악화가 의심되는 환자에서 고려 또는 감별해야 할 원인질환들

가장 빈번한 질환	**폐렴**
	• 흉부 X선 검사
	폐색전증
	• 임상적 가능성 평가(객혈, 수술, 골절, 악성종양의 병력, 심부정맥혈전증) • D-dimer • 흉부 CT angiography
	심부전
	• 흉부 X선 검사 • N-말단 프로-뇌나트륨배설펩타이드 (NT pro-BNP)와 BNP • 심장초음파검사
덜 빈번한 질환	**기흉, 흉막삼출**
	• 흉부 X선 검사 흉부 초음파
	심근경색증 그리고/또는 심장 부정맥(심방세동/조동)
	• 심전도검사 • 트로포닌

Classification of COPD AE

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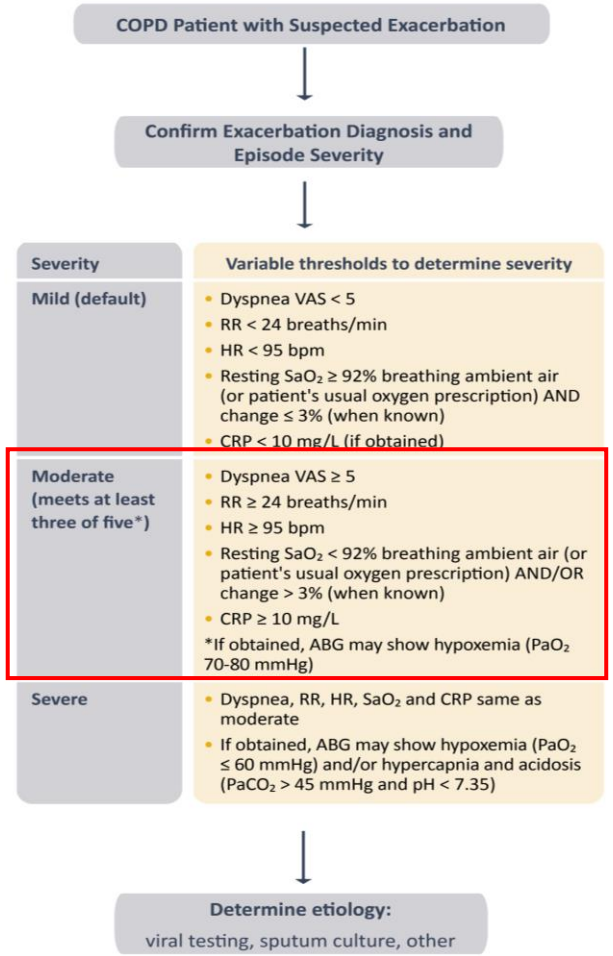
Severity of COPD Exacerbations

Figure 4.2



Adapted from: The Rome Proposal, Celli et al. (2021) Am J Respir Crit Care Med. 204(11): 1251-8.

Abbreviations: VAS visual analog dyspnea scale; RR respiratory rate; HR heart rate; SaO_2 oxygen saturation; CRP C-reactive protein; ABG arterial blood gases; PaO_2 arterial pressure of oxygen; $PaCO_2$ arterial pressure of carbon dioxide.

2024 진료지침

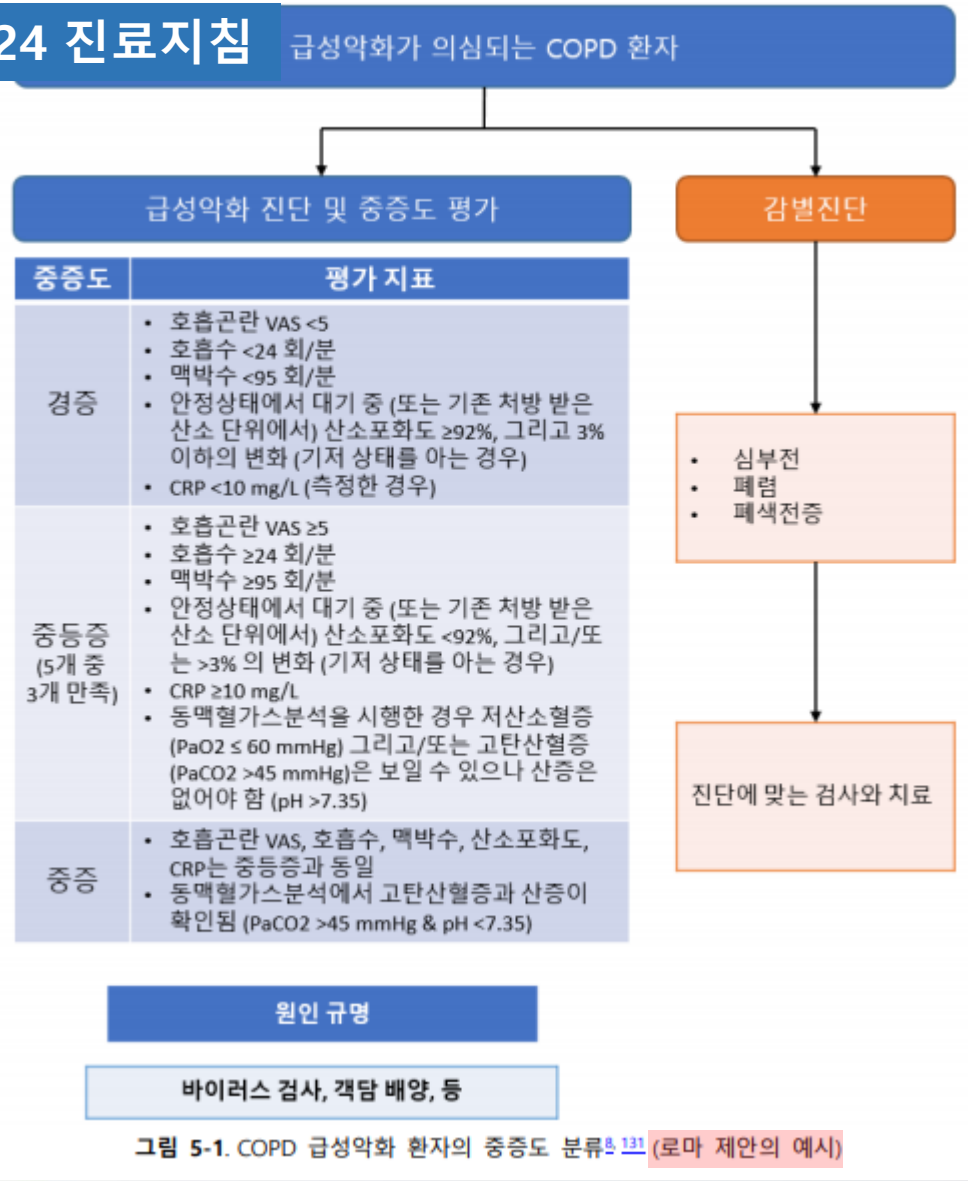


그림 5-1. COPD 급성악화 환자의 중증도 분류[8, 131] (로마 제안의 예시)

2026 GOLD

ropriate Place of Management During COPD Exacerbation

Figure 4.4

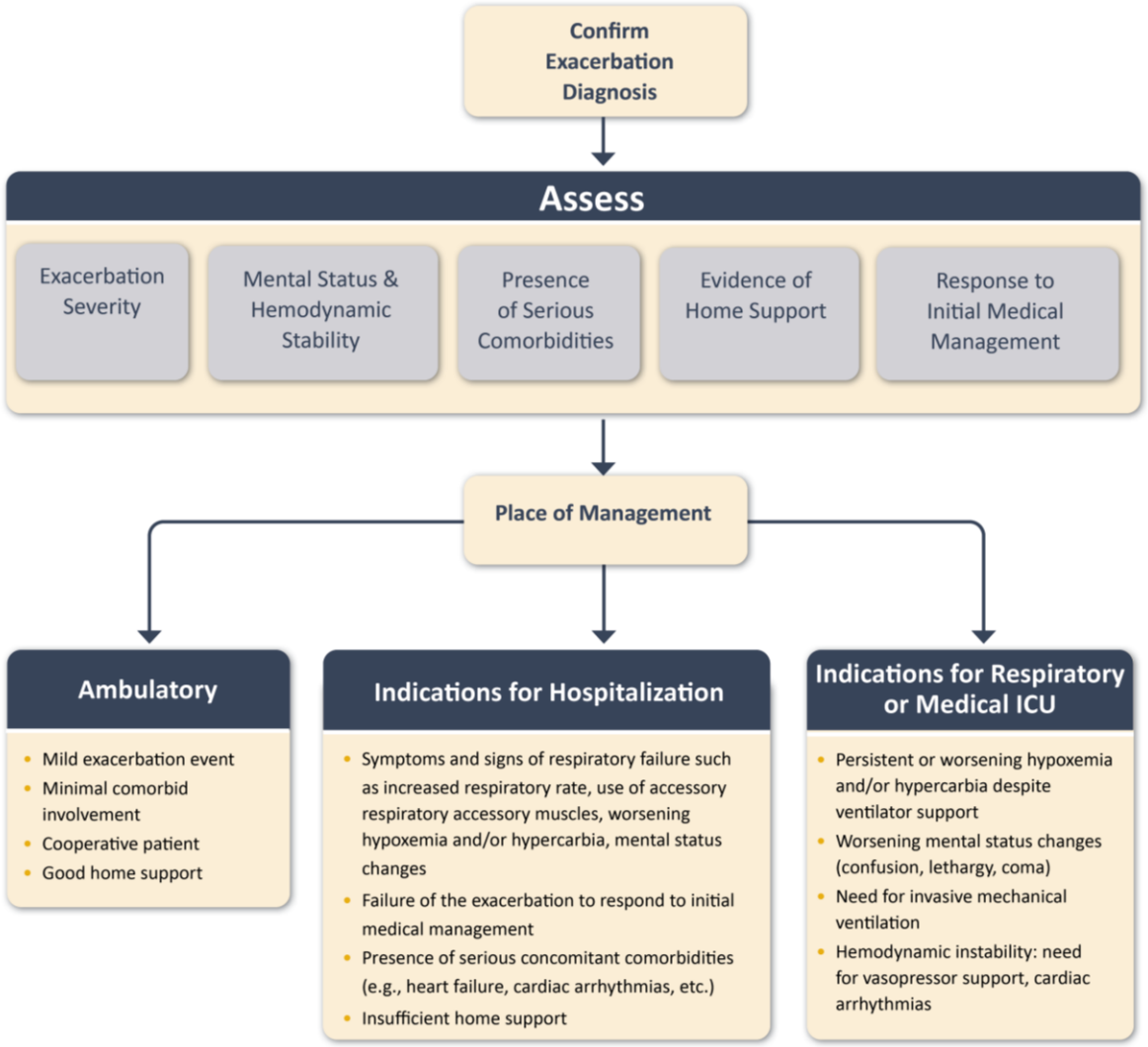


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표 5-1. 입원 적응증[1]

- 증상이 심한 경우 (안정 시 호흡곤란의 급격한 악화, 높은 호흡수, 산소포화도의 감소, 의식의 변화)
- 급성호흡부전
- 새로 발생한 진찰소견 (청색증, 부종 등)
- 초기 치료에 반응하지 않는 급성악화
- 심각한 동반질환 (심부전, 새로 발생한 부정맥 등)
- 가족이나 주위 사람의 도움을 기대하기 어려운 경우

표 5-2. COPD 악화 환자의 중환자실 치료 적응증

- 초기 응급처치에 반응이 나쁜 심한 호흡곤란
- 의식상태의 변화 (혼란, 기면, 혼수상태)
- 적절한 산소공급과 비침습적 기계환기의 사용에도 불구하고 저산소혈증 (PaO_2 <40 mmHg) 및 호흡성 산증 (pH <7.25)이 지속되거나 악화될 때
- 침습적 기계환기가 필요한 경우
- 혈역학적 불안정성이 있어 승압제 치료가 필요한 경우

Management of COPD AE

Management of Severe but not Life-threatening Exacerbations*

Figure 4.5

Assess severity of symptoms, blood gases, chest radiograph

Bronchodilators:

- Increase doses and/or frequency of short-acting bronchodilators
- Combine short-acting beta$_2$-agonists and anticholinergics
- Consider use of long-acting bronchodilators when patient becomes stable
- Use spacers or air-driven nebulizers when appropriate

Consider oral corticosteroids **Prednisolone 40mg during 5 days**

Consider antibiotics (oral) in patients with purulent oral secretions, prior positive sputum bacteria culture or requiring mechanical ventilation (invasive or noninvasive) **Duration of therapy; 5~7 days**

Consider high flow oxygen (HFNT) or noninvasive ventilation (NIV), obtain serial blood gas, venous blood gas and pulse oximetry measurements

At all times:

- Monitor fluid balance
- Consider subcutaneous heparin or low molecular weight heparin for thromboembolism prophylaxis
- Identify and treat associated conditions (e.g., heart failure, arrhythmias, pulmonary embolism etc.)

*Local resources need to be considered

항생제 선택

2026 GOLD

The choice of the antibiotic should be based on local bacterial resistance patterns. Usually, initial empirical treatment is an aminopenicillin with clavulanic acid, a macrolide, a tetracycline or, in selected patients, a quinolone. In patients with frequent exacerbations, severe airflow obstruction,[1056,1057] and/or exacerbations requiring mechanical ventilation,[1058] cultures from sputum or other materials from the lung should be performed, as gram-negative bacteria (e.g., *Pseudomonas* species) or resistant pathogens that are not sensitive to the above-mentioned antibiotics may be present. The route of administration (oral or intravenous) depends on the condition of the patient and pharmacokinetics of the antibiotic.

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결론적으로, COPD 급성악화 환자에서 호흡곤란 악화, 가래양의 증가, 화농성 객담의 증가, 3가지 주요증상 중에 3가지를 모두 만족시키는 경우, 또는 객담의 화농성 증가를 포함한 2가지를 만족하는 경우, 또는 기계호흡이 필요한 경우에서 항생제를 처방하여야 한다. 항생제의 치료 기간은 5-7일을 권고하며,[710] 외래에서 치료하는 환자의 경우 5일 이내의 치료를 권고한다[711]. 이 때, 항생제의 선택은 각 지역 세균의 항생제 내성 패턴에 근거해야 하며, 초기 경험적 치료에는 aminopenicillin-clavulanic acid, 3세대 cephalosporin을 사용할 수 있다. 특히, 65세 이상, FEV_1 50% 미만, 잦은 악화, 심장질환 동반 등의 위험인자를 갖고 있는 경우에는 fluoroquinolone (levofloxacin, moxifloxacin 등), *Pseudomonas* 감염의 위험인자가 있는 경우에는 anti-*Pseudomonal* antibiotics을 초기 치료부터 고려할 수 있다[712].

Discharge Criteria

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Discharge Criteria and Recommendations for Follow-up

Figure 4.10

1. Full review of all clinical and laboratory data
2. Check maintenance therapy (see **Figure 3.9**, patients with elevated blood eosinophils should be discharged on LABA+LAMA+ICS)
3. Reassess inhaler technique
4. Ensure understanding of withdrawal of acute medications (steroids and/or antibiotics)
5. Assess need for continuing supplemental oxygen
6. Provide management plan
7. Follow-up comorbidities such as cardiovascular disease
8. Ensure follow-up arrangements: early follow-up < 4 weeks, and late follow-up > 12 weeks as indicated

1 – 4 Weeks Follow-up

- Evaluate ability to cope in his/her usual environment
- Review understanding of treatment regimen
- Reassessment of inhaler techniques
- Reassess need for long-term oxygen
- Document the capacity to do physical activity and consider patient eligibility to be enrolled in pulmonary rehabilitation
- Document symptoms: CAAT™ or mMRC
- Determine status of comorbidities

12 – 16 Weeks Follow-up

- Evaluate ability to cope in his/her usual environment
- Review understanding of treatment regimen
- Reassessment of inhaler techniques
- Reassess need for long-term oxygen
- Document the capacity to do physical activity and activities of daily living
- Measure spirometry: FEV1
- Document symptoms: CAAT™ or mMRC
- Determine status of comorbidities

2024 진료지침

표 5-5. 급성악화 환자의 퇴원시 평가해야 할 체크리스트 항목

- 임상적 자료 및 검사 결과의 전반적인 검토
- 유지치료 및 질병에 대한 환자의 이해 정도 확인
- 흡입기 사용의 숙련도 재평가
- 스테로이드, 항생제와 같은 급성악화 약물의 중지에 대한 확인
- 장기 산소치료의 필요성에 대한 검토
- 동반질환과 추적 관찰에 대한 정보 제공
- 추적 관찰에 대한 확인: 빠르면 4주이내, 늦어도 12주 이내에 환자의 상태에 따라 계획.
- 모든 임상적 또는 검사 결과의 이상 소견에 대해 확인

표 5-6. 급성악화 관련 퇴원 1-4주 후 추적방문 시 평가해야 할 항목

- 일상생활 수행능력의 평가
- 치료 요법의 검토
- 흡입기 사용 방법 평가
- 장기 산소치료의 필요성 검토
- 신체활동능력 평가와 호흡재활의 필요성 검토
- 증상에 대한 평가 (CAT 또는 mMRC)
- 동반질환의 상태 평가

표 5-7. 급성악화 관련 퇴원 12-16주 후 추적방문 시 평가해야 할 항목

- 일상생활 수행능력의 평가
- 치료 요법의 검토
- 흡입기 사용 방법 평가
- 장기 산소치료의 필요성 검토
- 신체활동능력 평가
- 폐기능 측정 (FEV_1)
- 증상에 대한 평가 (CAT 또는 mMRC)
- 동반질환의 상태 평가

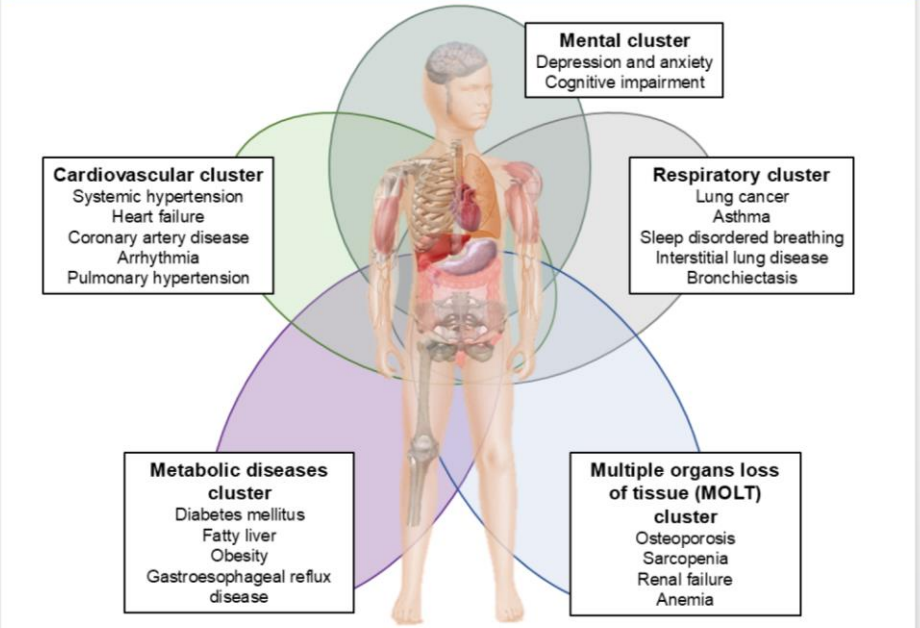
Contents

양산부산대학교병원
Pusan National University Yangsan Hospital

Comorbidities of COPD

- Multimorbidity occur frequently in COPD patients
  - Cardiovascular disease
  - Skeletal muscle dysfunction
  - Metabolic syndrome
  - Osteoporosis
  - Depression
  - Anxiety
  - lung cancer

Morbidity Clusters Frequently Present in Patients with COPD that Independently Impact Outcomes Figure 5.2

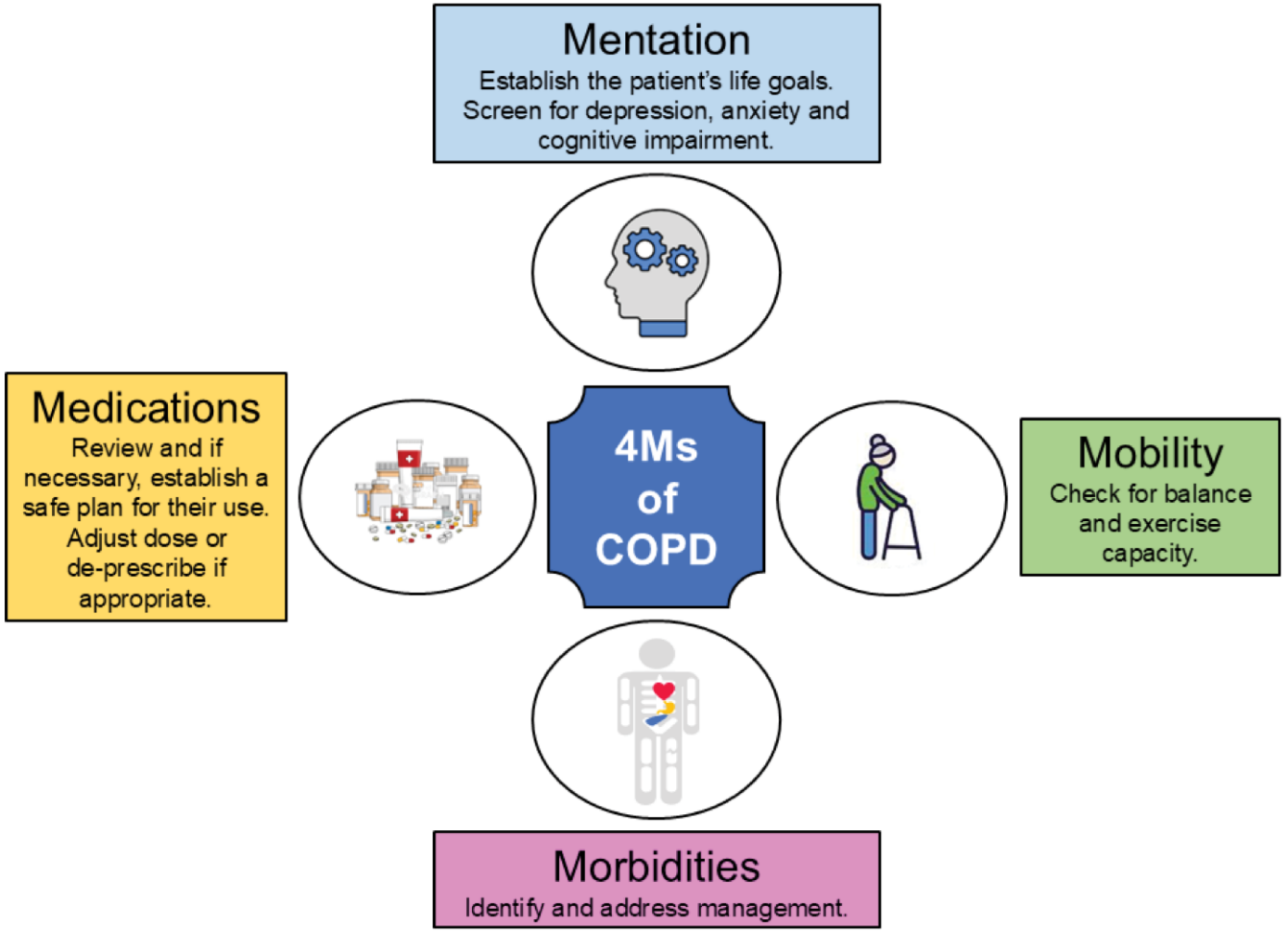


Adapted from: Celli BR, Fabbri LM, Yohannes AM, Hawkins NM, Criner GJ, Bon J, Humbert M, Jenkins CR, Pantoni L, Papi A, Quint JK, Sethi S, Stolz D, Agusti A, Sin DD. A person-centred clinical approach to the multimorbid patient with COPD. Eur J Intern Med. 2025 Aug 12:106424. doi: 10.1016/j.ejim.2025.07.020.

<u>These comorbidities should be actively sought</u>, and treated appropriately when present, because <u>they influence health statue, hospitalizations and mortality.</u>

Summary of the Modified 4Ms Person-centered Approach to Multimorbid Patients with COPD

Figure 5.1

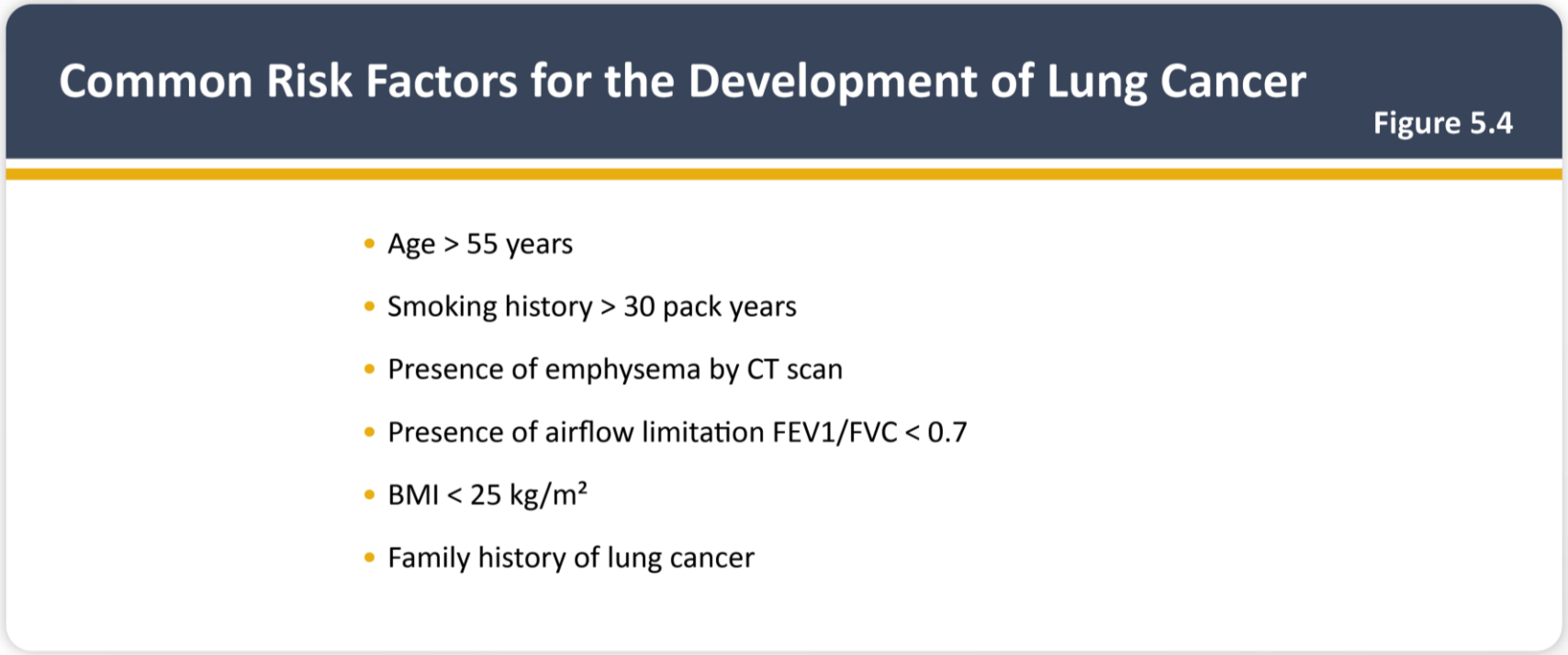


Adapted from: Celli BR, Fabbri LM, Yohannes AM, Hawkins NM, Criner GJ, Bon J, Humbert M, Jenkins CR, Pantoni L, Papi A, Quint JK, Sethi S, Stolz D, Agusti A, Sin DD. A person-centred clinical approach to the multimorbid patient with COPD. Eur J Intern Med. 2025 Aug 12:106424. doi: 10.1016/j.ejim.2025.07.020.

동반질환

- 심혈관질환(심부전, 허혈성 심장질환, 부정맥, 말초동맥질환, 고혈압)
- 골다공증
- 불안과 우울증
- 폐암
- 대사증후군과 당뇨병
- 위식도역류질환
- 기관지확장증
- 결핵성파괴폐
- 인지장애
- 폐쇄수면무호흡과 COPD-수면무호흡 중복 증후군
- 노쇠
- 다중질환의 일부로서 COPD(2개 이상의 만성 질환)

Risk Factors for Lung Cancer



- An annual LDCT scan is recommended for lung cancer screening in patients with a smoking history, similar to recommendations for the general population.

폐암 선별검사

표6-1. 폐암 발생의 흔한 위험인자

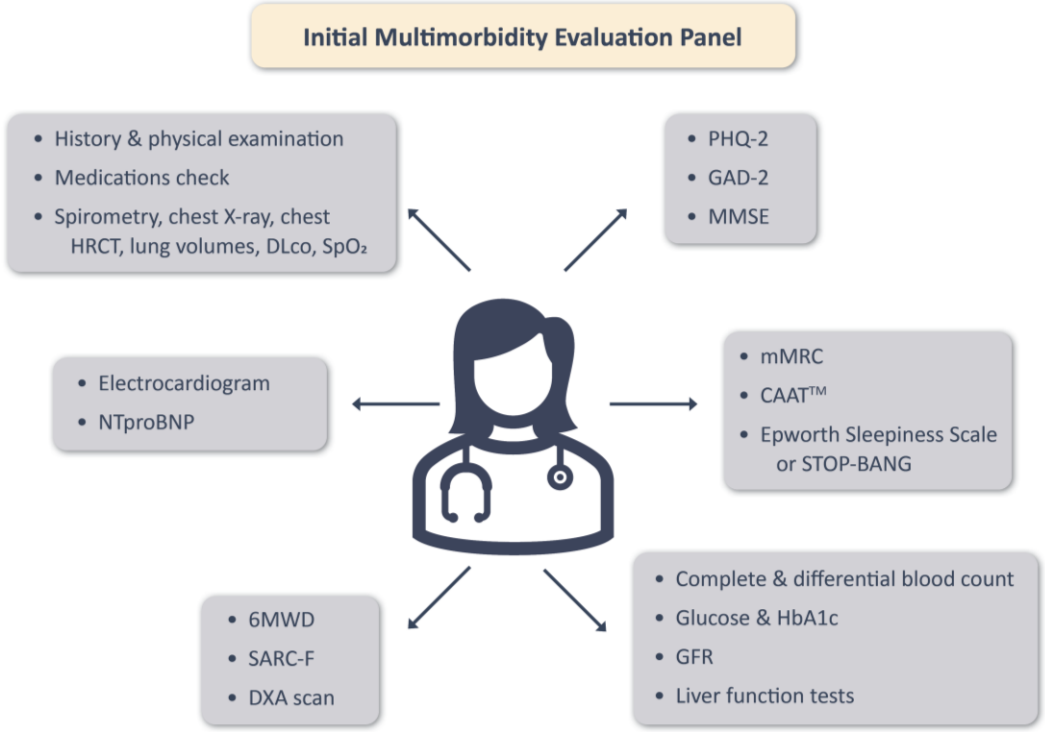
- 나이 > 55세
- 흡연력 > 30갑년
- 흉부CT에서 폐기종
- 기도폐쇄, FEV1/FVC < 0.7
- 체질량지수 < 25Kg/m^2
- 폐암 가족력

- **흡연과 연관된 COPD 환자**는 **매년 저선량 CT를 권유**하는 것이 바람직하다.

Approach for the Detection of Morbidities

Potential Complementary Approach for the Detection of Frequent Morbidities in all Patients with COPD – Initial Evaluation

Figure 5.5

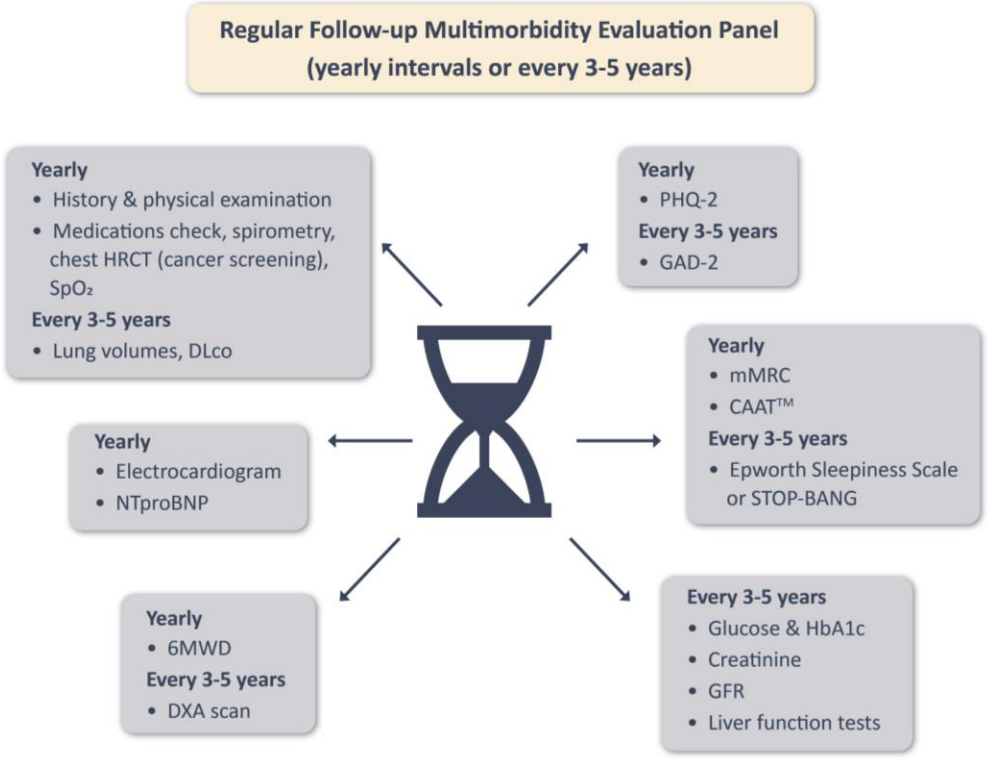


Abbreviations: HRCT, high-resolution computerized tomography; DLco, diffusing capacity for carbon monoxide; SpO_2, oxygen saturation; SARC-F, Strength, Assistance walking, Rising from chair, Climbing stairs and Falls; DXA, dual energy X-ray absorptiometry; mMRC, modified Medical Research Council dyspnea scale; CAAT™, Chronic Airways Assessment Test; GFR, glomerular filtration rate; NTproBNP, N-terminal prohormone of brain natriuretic peptide; 6MWD, 6-minute walking distance test; HbA1c, glycated hemoglobin A1c test; PHQ-2, Patient Health Questionnaire-2; GAD-2, Generalized Anxiety Disorder-2; MMSE, Mini Mental State Examination.

Adapted from: Celli BR, Fabbri LM, Yohannes AM, Hawkins NM, Criner GJ, Bon J, Humbert M, Jenkins CR, Pantoni L, Papi A, Quint JK, Sethi S, Stolz D, Agusti A, Sin DD. A person-centred clinical approach to the multimorbid patient with COPD. Eur J Intern Med. 2025 Aug 12:106424. doi: 10.1016/j.ejim.2025.07.020.

Potential Complementary Approach for the Detection of Frequent Morbidities in all Patients with COPD – Regular Follow-up

Figure 5.6



Abbreviations: HRCT, high-resolution computerized tomography; DLco, diffusing capacity for carbon monoxide; SpO_2, oxygen saturation; SARC-F, Strength, Assistance walking, Rising from chair, Climbing stairs and Falls; DXA, dual energy X-ray absorptiometry; mMRC, modified Medical Research Council dyspnea scale; CAAT™, Chronic Airways Assessment Test; GFR, glomerular filtration rate; NTproBNP, N-terminal prohormone of brain natriuretic peptide; 6MWD, 6-minute walking distance test; HbA1c, glycated hemoglobin A1c test; Patient Health Questionnaire-2; GAD-2, Generalized Anxiety Disorder-2.

Adapted from: Celli BR, Fabbri LM, Yohannes AM, Hawkins NM, Criner GJ, Bon J, Humbert M, Jenkins CR, Pantoni L, Papi A, Quint JK, Sethi S, Stolz D, Agusti A, Sin DD. A person-centred clinical approach to the multimorbid patient with COPD. Eur J Intern Med. 2025 Aug 12:106424. doi: 10.1016/j.ejim.2025.07.020.

COPD환자의 추적 관찰시 평가 항목 요약

표 3-5. COPD 환자의 추적 관찰시 평가 항목 요약

	모든 COPD 환자	추가 평가 항목(FEV_1 < 30% 예측치인 경우)
질환의 진행과 합병증 발생에 대한 추적		
증상 평가	• 기침, 가래, 호흡곤란, 피로, 활동제한, 수면장애 여부 • CAT, mMRC • 평소 운동 및 활동량 • 호흡 재활 필요성	• 폐성심(cor pulmonale) 발생 여부 • 장기산소요법의 필요성
폐기능 평가	• 1초간 강제호기량(FEV_1) 및 강제폐활량(FVC) • 6분보행검사	• 동맥혈 산소포화도(SaO_2)

COPD환자의 추적 관찰시 평가 항목 요약

급성 악화	• 급성 악화 여부, 빈도, 중등도, 원인 • 외래 내원시 화농성 객담 여부 • 전문가에게 의뢰하는 것을 고려	
영상 검사	• 증상 악화시 고려 • 반복적인 화농성 객담이 있을 때: 기관지확장증에 대한 감별이 필요	
흡연 여부	• 매 방문시 현재 흡연 상태 확인 • 현재 흡연 중일 때 금연교육 시행	
약물 치료 순응도 확인		
	• 처방된 약물의 용량 및 투약 용법 • 치료에 대한 순응도 • 흡입제 사용법 • 현재 치료의 효과 • 치료 부작용	

COPD환자의 추적 관찰시 평가 항목 요약

동반 질환에 대한 평가		
	• 심혈관질환 • 폐암 • 영양상태 및 BMI • 골다공증 • 수면무호흡증 • 우울증/불안	

Contents

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AI and Emerging Technologies in COPD

- **AI** can help in the diagnosis, assessment, clinical management, and prediction of prognosis of COPD.
- AI comes with risks and limitations that need careful consideration before deployment in clinical practice.
- Telehealth includes virtual, hybrid virtual and in-person care models.
- **Telehealth** may offer improved healthcare access, outcomes, and affordability.
- **Pulmonary rehabilitation** and **self-management** may be delivered virtually.
- Evidence is still emerging regarding the effectiveness of virtual compared to in-person delivery.

Summary

1. 2026 GOLD에서는 COPD 진단을 위해 **Screening** 및 **case-finding** 대한 구체적인 접근 방법이 제시되었다.

2. 2026 GOLD에서는 **중등도 급성 악화 1회 이상부터 E 그룹으로 분류**되며, **2024 국내 진료지침은 지난 1년 동안 급성악화가 2회 이상있거나 입원할 정도로 심한 악화가 있었던 환자를 고위험군으로 분류**한다.

3. 2026 GOLD에서는 **COPD의 새로운 치료 목표**로 **no exacerbation, no worsening of symptoms, no lung function decline**이 없는 상태인 **low disease activity**가 제시되었다.

4. 2026 GOLD에서는 초기 약물 치료와 추적 약물 치료가 명확히 구분되며 단계별 치료 전략이 강조되었다.

5. 2026 GOLD에서는 COPD 치료에서 biologics 옵션으로 **mepolizumab이 추가**되었다.

6. 2024년 국내 COPD 진료지침은 한국의 의료 환경과 보험 급여 체계를 보다 충실히 반영하여 실제 임상에서 적용 가능하도록 구체적이고 실용적으로 제시되었다.

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Pusan National University Yangsan Hospital

환자 내몸

경청해 주셔서 감사합니다.

Thank you for your attention