Updates in Chronic Obstructive Pulmonary Disease (COPD)

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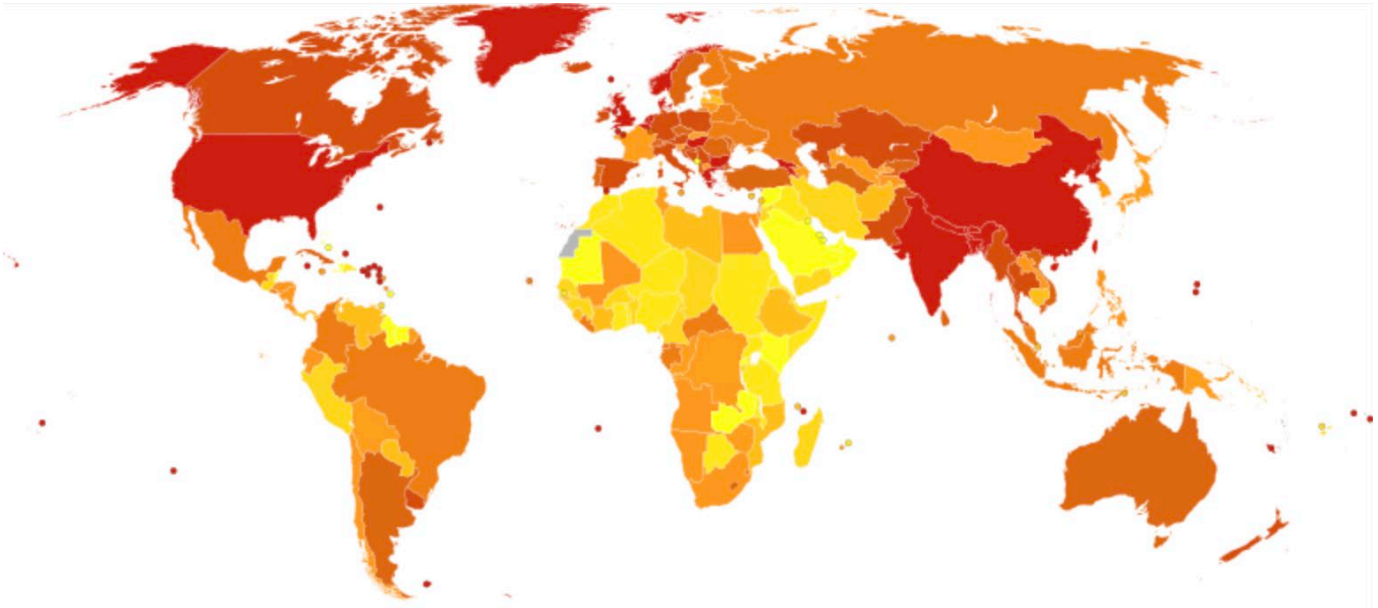
Disclosures

No financial disclosures

Objectives

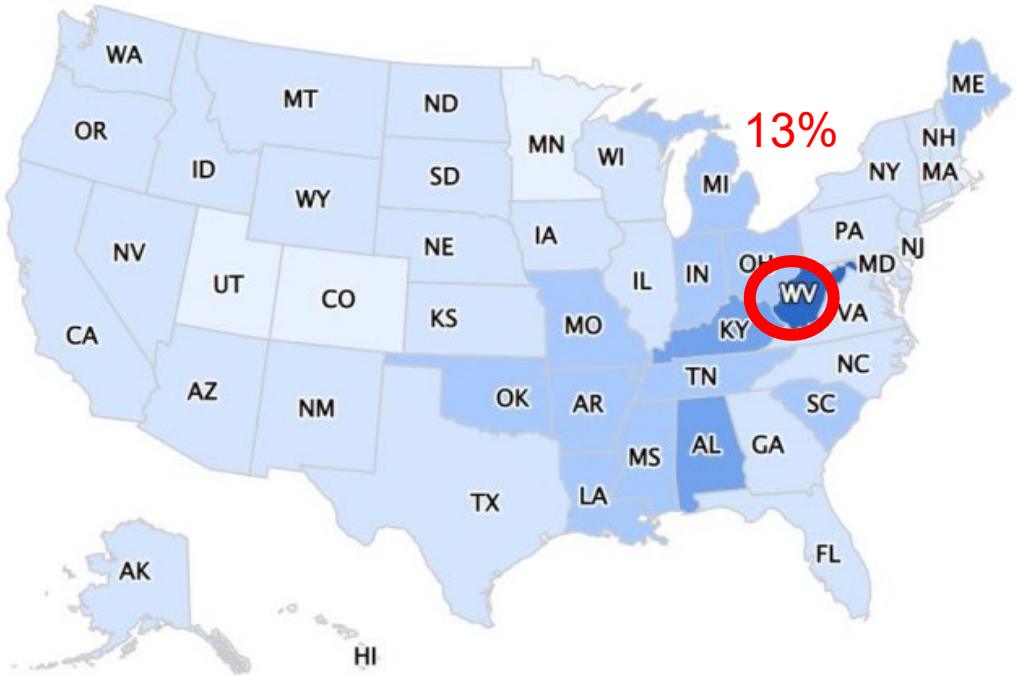
- Review GOLD 2024 recommendations for screening for COPD.
- Review changes in ATS/ERS 2022 interpretative strategies for spirometry: Z-Score, new definition of bronchodilator response, grading of severity, PRISM.
- Review differences in COPD diagnosis using ATS vs GOLD spirometric criteria.
- Review changes in GOLD group classification in the initial COPD assessment: from ABCD to ABE.
- Review implications of eosinophilia in COPD and evolving targeted therapies.
- Summarize therapies supporting reduction in mortality in patients with COPD.

COPD: why it matters



- COPD is the **third l**eading cause of death worldwide
- In 2021 COPD was 6th leading cause of death in US
- 5% of adults or 12.5 million Americans are living with COPD
- COPD treatment costs an estimated $50 billion annually
- **Increased trajectory** among those aged ≥75 years, those living in rural areas, and those who ever smoked.

COPD: why it matters



COPD by the Numbers in West Virginia	
Adults diagnosed with COPD [5]	186,185
COPD prevalence [5]	13.1%
COPD mortality [3]	1,546
Annual cost of COPD treatment [4]	$249 Million
Workdays lost to COPD [4]	135,300
Medicare hospitalizations [2]	1,836

Who is most likely to have worse outcomes and barriers to treatment?

- People living in rural communities.
- People with lower income levels.
- People with lower educational levels.

2023

American Lung Association

Indicator Reports

State of the Air [6]**:** Berkley County, WV received an **"B"** for particle pollution.

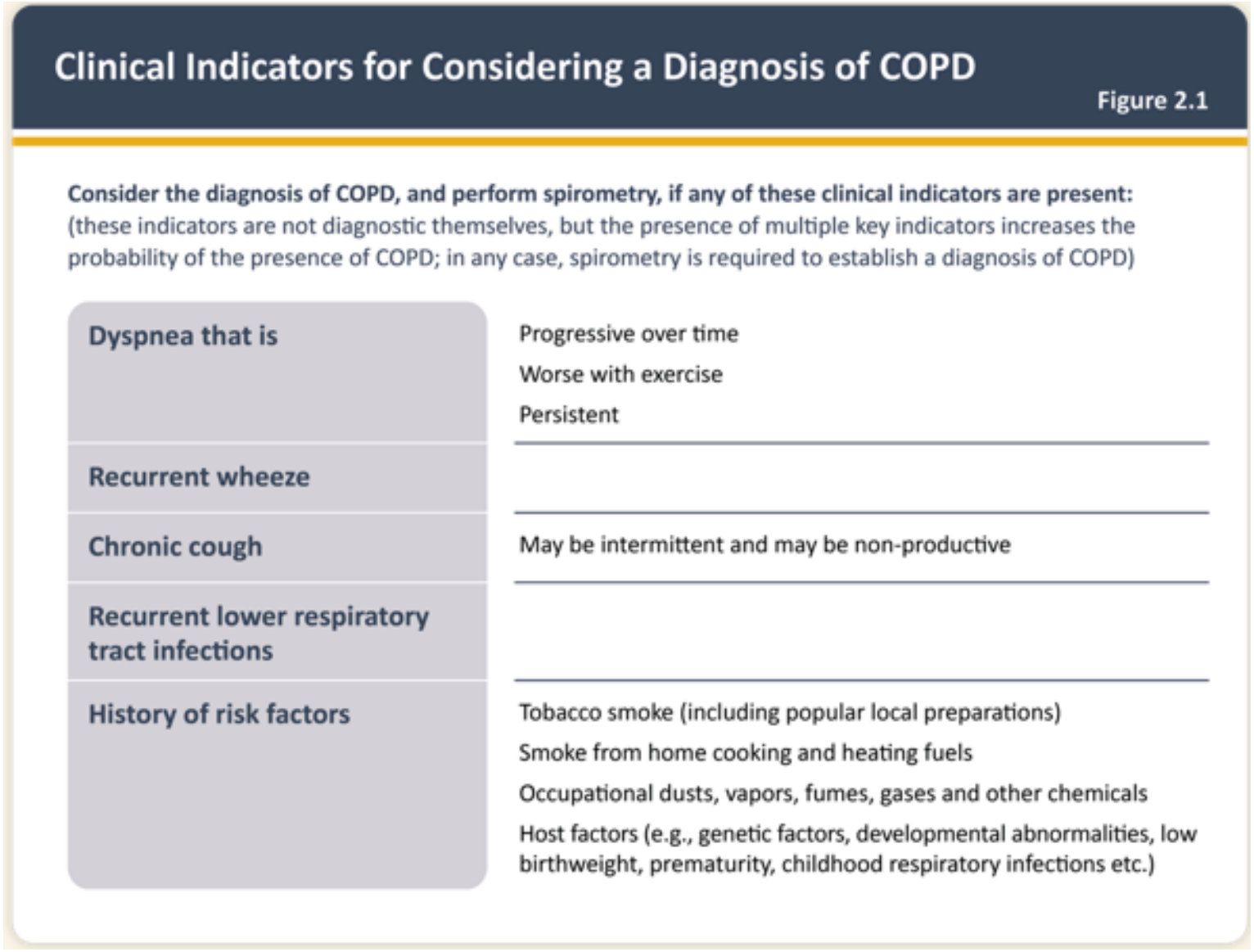
State of Tobacco Control [7]**:** scored an **"F"** in access to cessation services.

State of Lung Cancer [8]**: 4.6%** of high risk adults were screened for lung cancer.

Who should be screened?

Asymptomatic:
No Exposure/Risk Factor
=
No screening

Symptomatic/Risk Factors
=
Spirometry



Clinical Indicators for Considering a Diagnosis of COPD

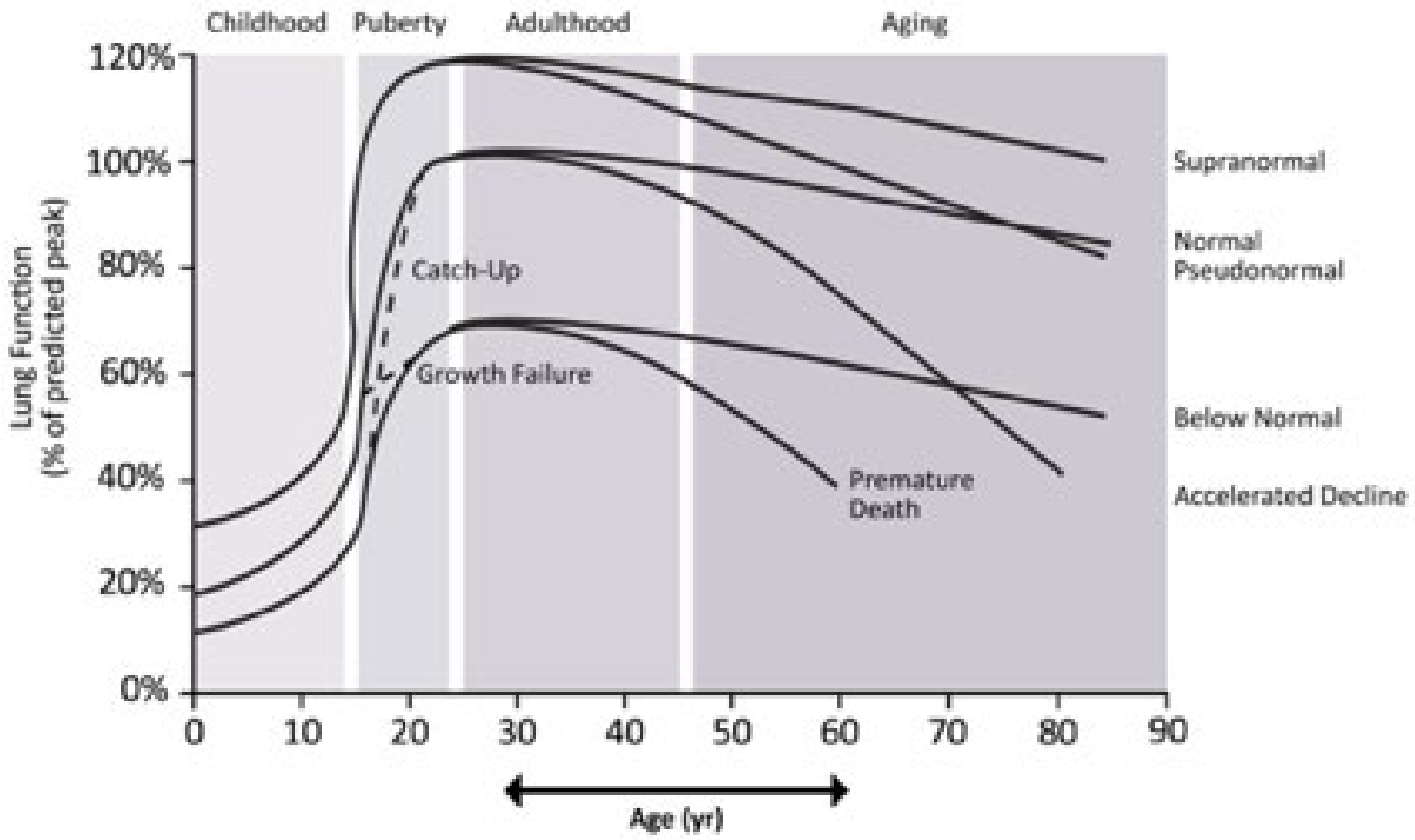
Figure 2.1

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.)

FEV1 Trajectories (TR) Over the Life Course

Figure 1.1



Modified from: Agusti A, Hogg JC. Update on the Pathogenesis of Chronic Obstructive Pulmonary Disease. N Engl J Med. 2019;381:1248-56.

NEW: Screening in Targeted Populations

Diagnosis: Spirometry

ATS/ERS 2022

FEV1/FVC < 5th Percentile or Z score

GOLD 2024

FEV1/FVC < 0.70 post BD

NEW ATS/ERS PFT GUIDELINES

EUROPEAN RESPIRATORY JOURNAL
ERS OFFICIAL DOCUMENTS
S. STANOJEVIC ET AL.

ERS/ATS technical standard on interpretive strategies for routine lung function tests

Sanja Stanojevic[1], David A. Kaminsky[2], Martin R. Miller[3], Bruce Thompson[4], Andrea Aliverti[5], Igor Barjaktarevic[6], Brendan G. Cooper[7], Bruce Culver[8], Eric Derom[9], Graham L. Hall[10], Teal S. Hallstrand[8], Joerg D. Leuppi[11,12], Neil MacIntyre[13], Meredith McCormack[14], Margaret Rosenfeld[15] and Erik R. Swenson[8,16]

Eur Respir J 2022; 60: 2101499

2005 ATS/ERS	2022 ATS/ERS
NHANES	GLI
LLN	Z-Score (LLN-ULN)
BDR: ≥12% and 200mL in FEV1 or FVC from baseline	BDR: >10% of pred value in FEV1 or FVC
Severity : % predicted	Severity: Z –score
Decline over time: variable	Decline over time: FEV1Q

OLD vs NEW

Eur Respir J 2022; 60: 2101499

Reference equation

2005

NHANES III (National Health and Nutrition Examination Survey) was endorsed in the 2005 guidelines

New 2022 guidelines use the **GLI** (Global Lung Function Initiative)

- Generated from data using >73,000 healthy nonsmokers aged 3-95

2022

Z score

LLN primarily emphasizes only whether a result is normal or abnormal

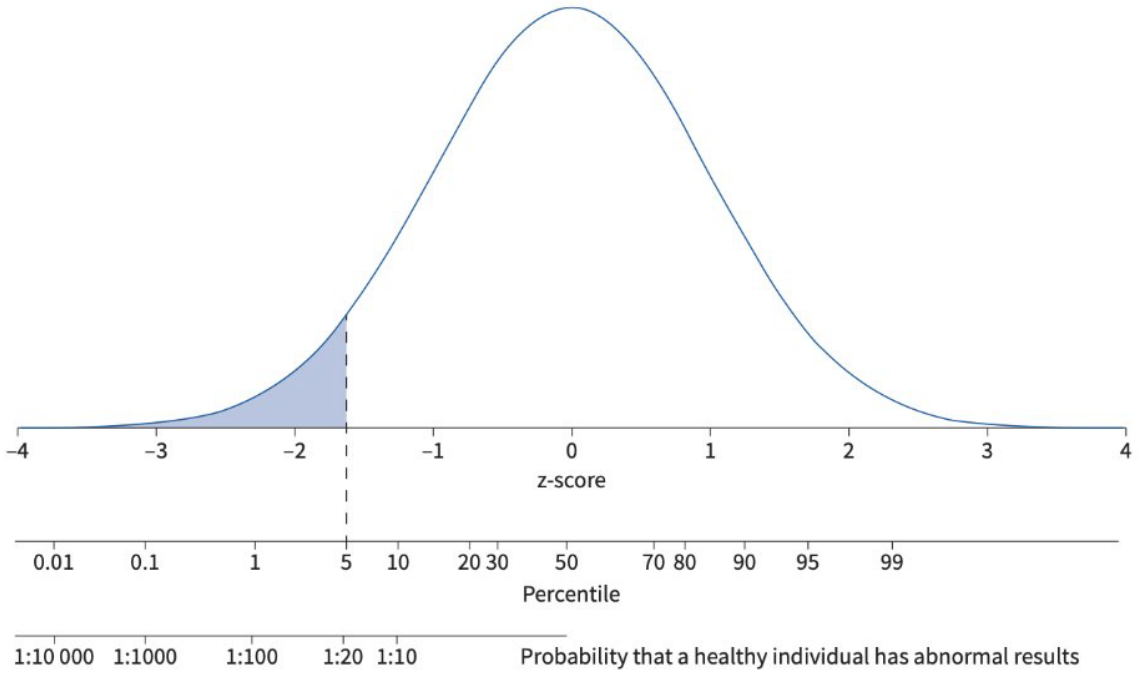


FIGURE 2 The normal distribution with z-scores and percentiles displayed. Percentile can be interpreted as the probability that a healthy individual has results inside the normal range (*i.e.* the false-positive rate).

The Z score is a description of how far a result is from the mean value.

Emphasizes the **probability** that a result is normal or abnormal

Eur Respir J 2022; 60: 2101499

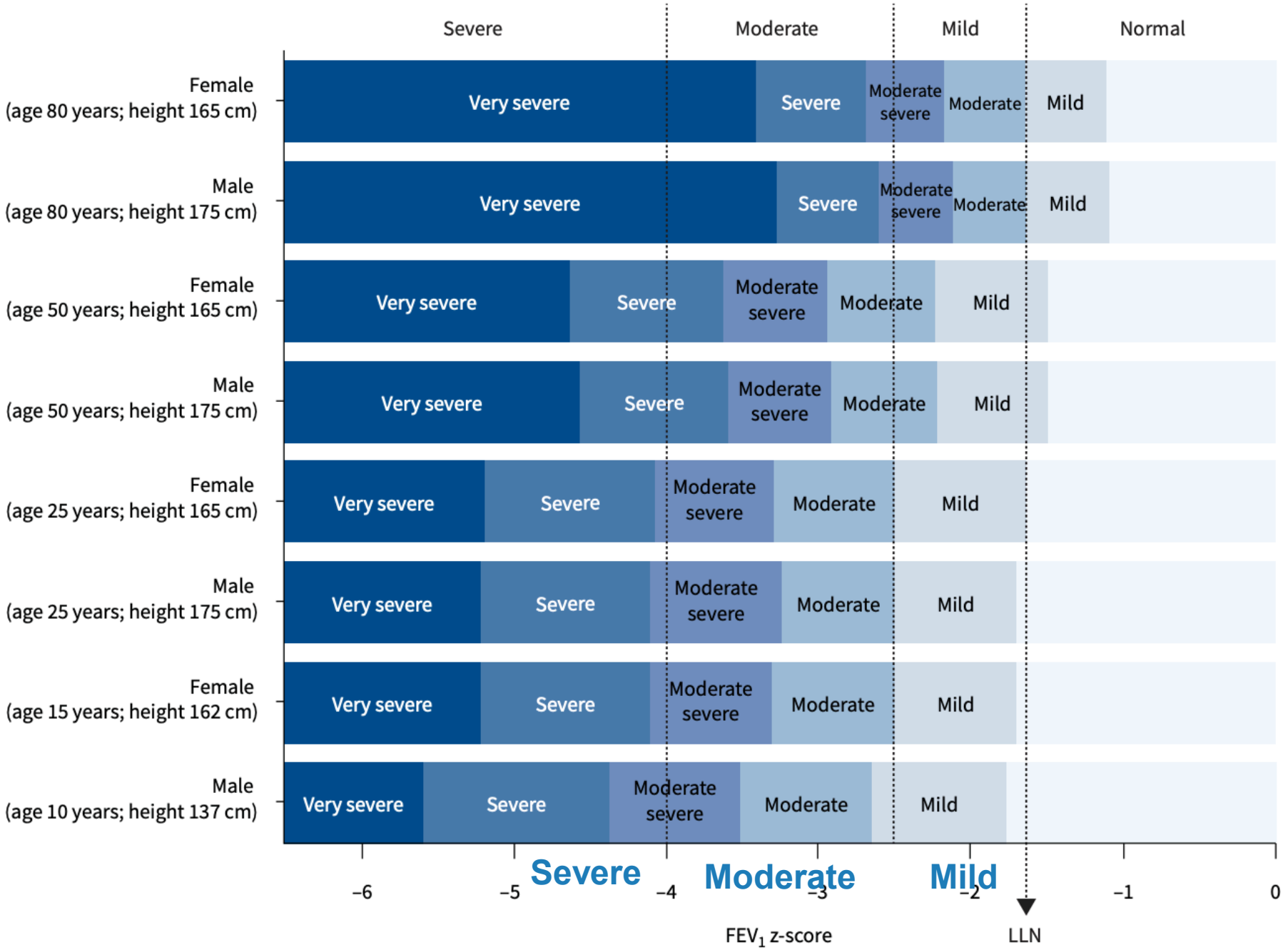
TABLE 6 Severity of any spirometric abnormality based on the forced expiratory volume in one second (FEV_1)

Degree of severity	FEV_1 % pred
Mild	>70
Moderate	60–69
Moderately severe	50–59
Severe	35–49
Very severe	<35

% pred: % predicted.

Degree of Severity	Z-score
Normal	-1.645 to +1.645
Mild	-2.5 to -1.65
Moderate	-2.51 to -4
Severe	<4.1

Severity


Severe
Moderate
Mild
Normal
Female (age 80 years; height 165 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Male (age 80 years; height 175 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Female (age 50 years; height 165 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Male (age 50 years; height 175 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Female (age 25 years; height 165 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Male (age 25 years; height 175 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Female (age 15 years; height 162 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Male (age 10 years; height 137 cm)
Very severe
Severe
Moderate severe
Moderate
Mild
Severe
Moderate
Mild
−6
−5
−4
−3
−2
−1
0
FEV1 z-score
LLN

Bronchodilator Response

BOX 1 Determination of a bronchodilator response

$$\text{Bronchodilator response} = \frac{(\text{post-bronchodilator value (L)} - \text{pre-bronchodilator value (L)}) \times 100}{\text{predicted value (L)}^{\#}}$$

A change of >10% is considered a significant bronchodilator response.

#: predicted value should be determined using the appropriate Global Lung Function Initiative (GLI) spirometry equation.

For example, a 50-year-old male, height 170 cm, has a pre-bronchodilator forced expiratory volume in 1 s (FEV_1) of 2.0 L and a post-bronchodilator FEV_1 of 2.4 L. The predicted FEV_1 is 3.32 L (GLI 2012 "other" equation).

$$\text{Bronchodilator response} = \frac{(2.4 - 2.0) \times 100}{3.32} = 12.1\%$$

Therefore, their bronchodilator response is reported as an increase of 12.1% of their predicted FEV_1 and classified as a significant response.

ATS/ERS 2005: >200mL AND ≥12% increase in FEV1 and/or FVC

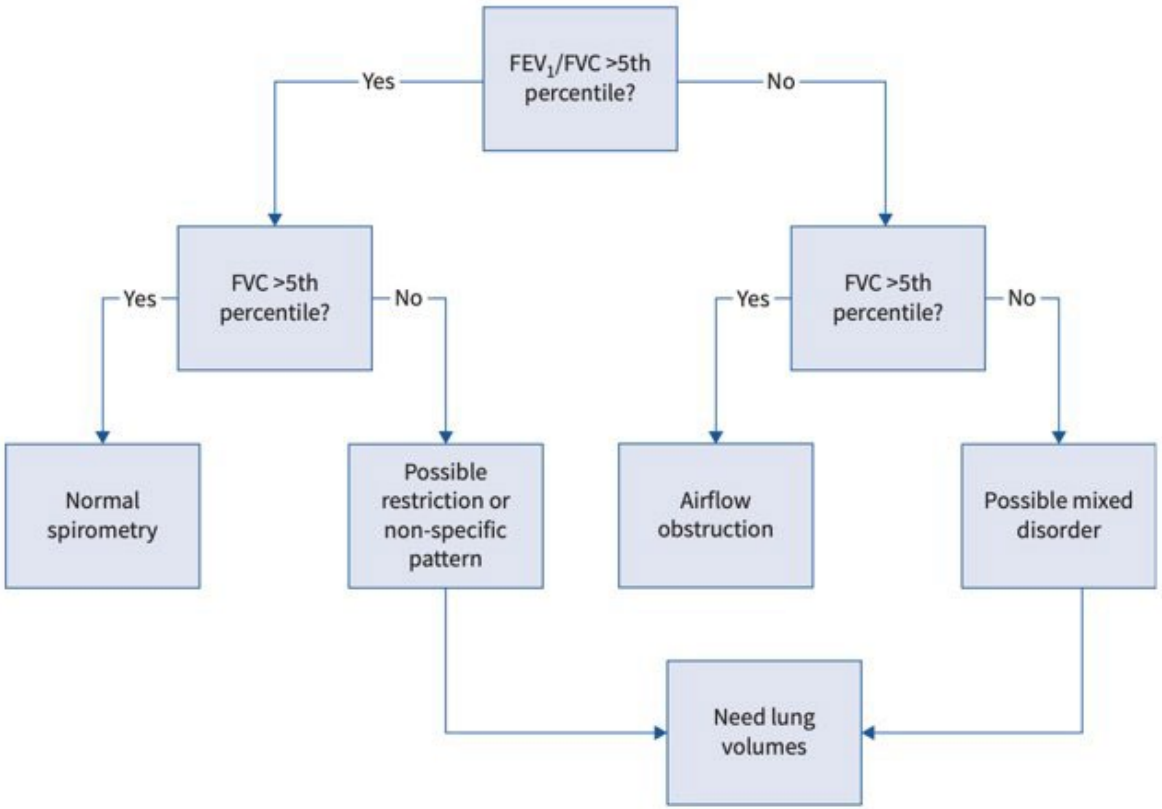
FEV1 Q Decline over time

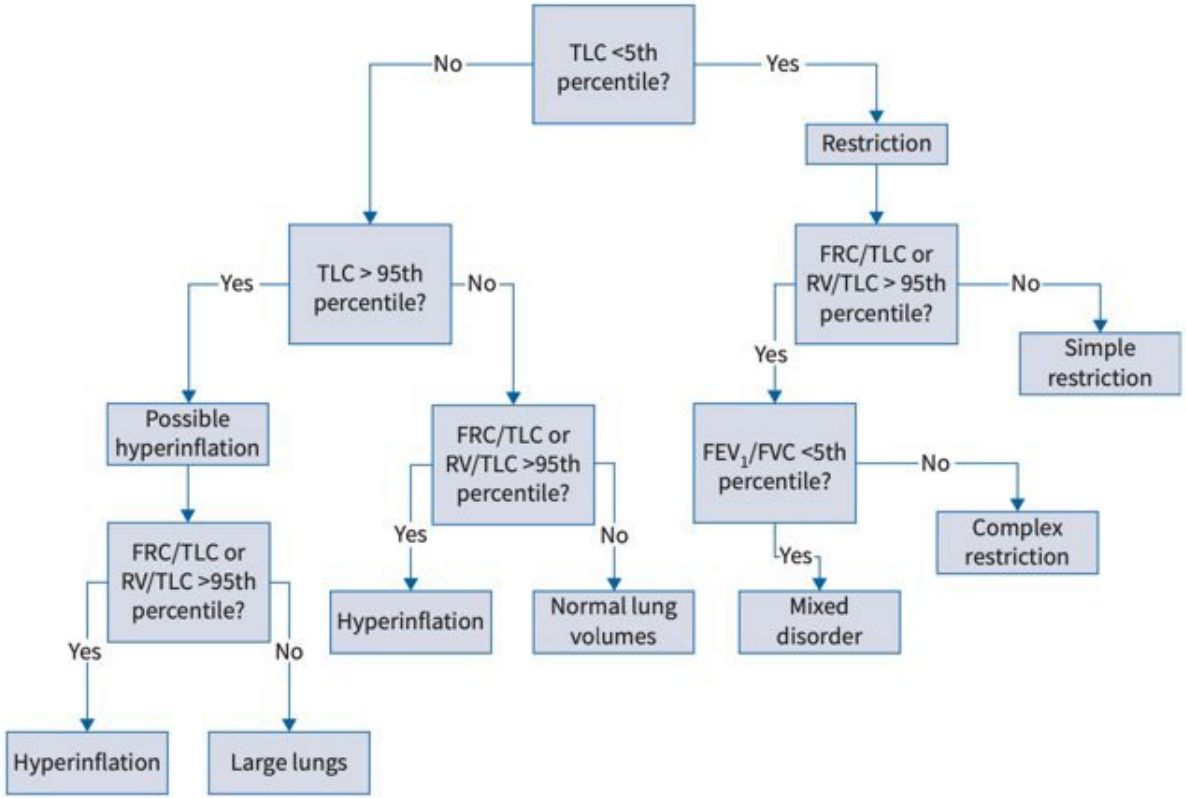
Instead of tracking how far you are from healthy range

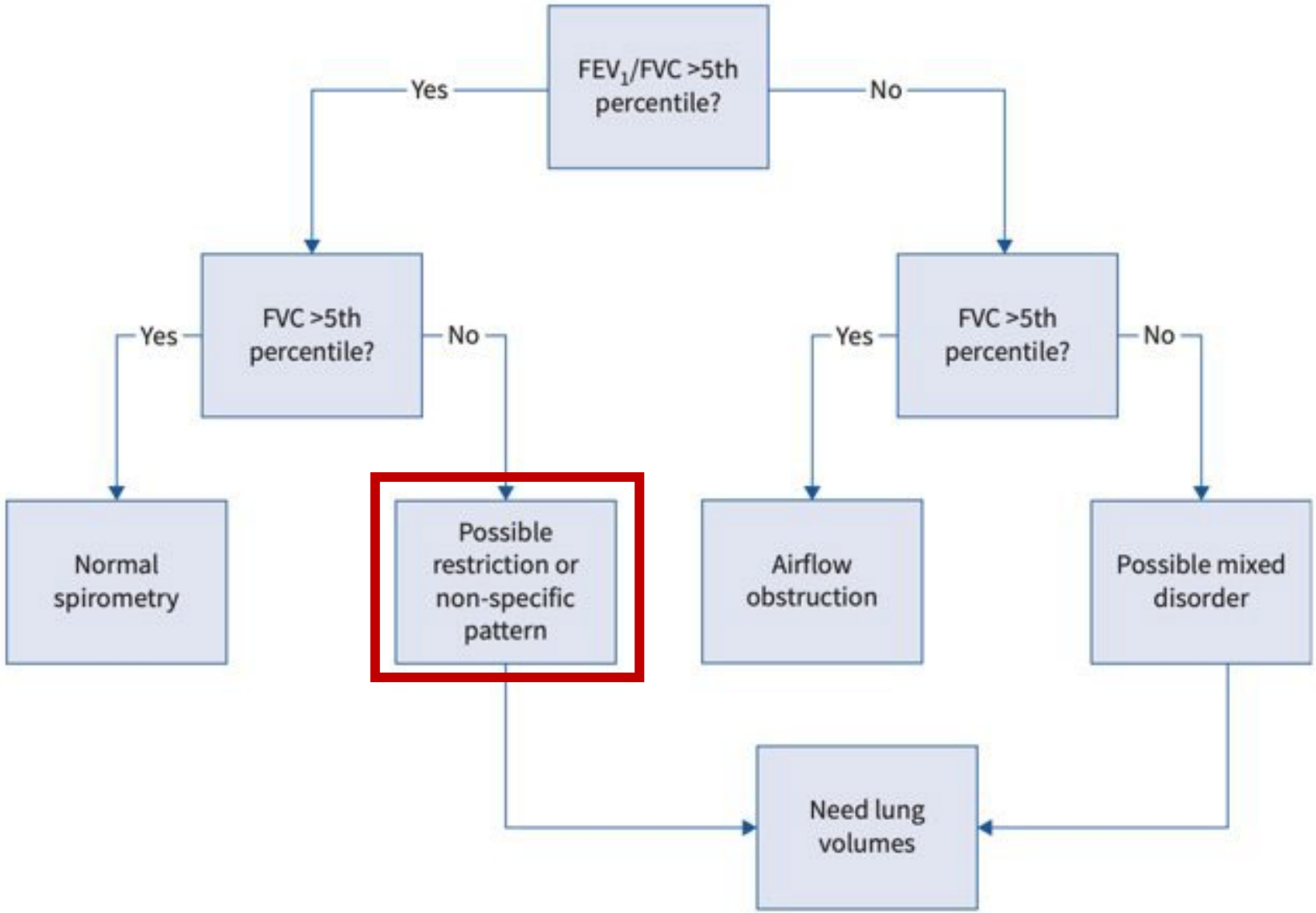
Track how far someone is from the lower limit in disease

FEV1q strongly linked to survival probability

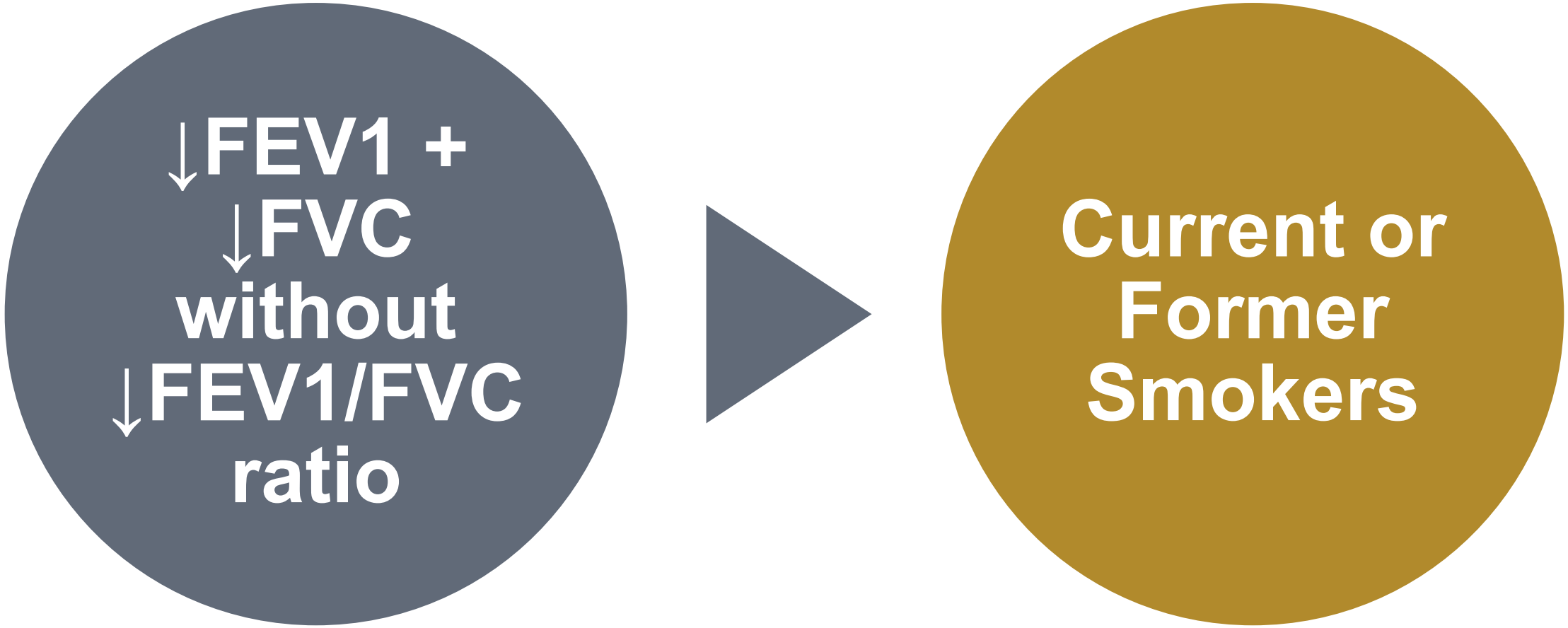
Updated Algorithms






FEV1/FVC >5th percentile?
Yes
No
FVC >5th percentile?
Yes
No
FVC >5th percentile?
Yes
No
Normal spirometry
Possible restriction or non-specific pattern
Airflow obstruction
Possible mixed disorder
Need lung volumes

PRISm (Preserved Ratio Impaired Spirometry)



PRISm (Preserved Ratio Impaired Spirometry)

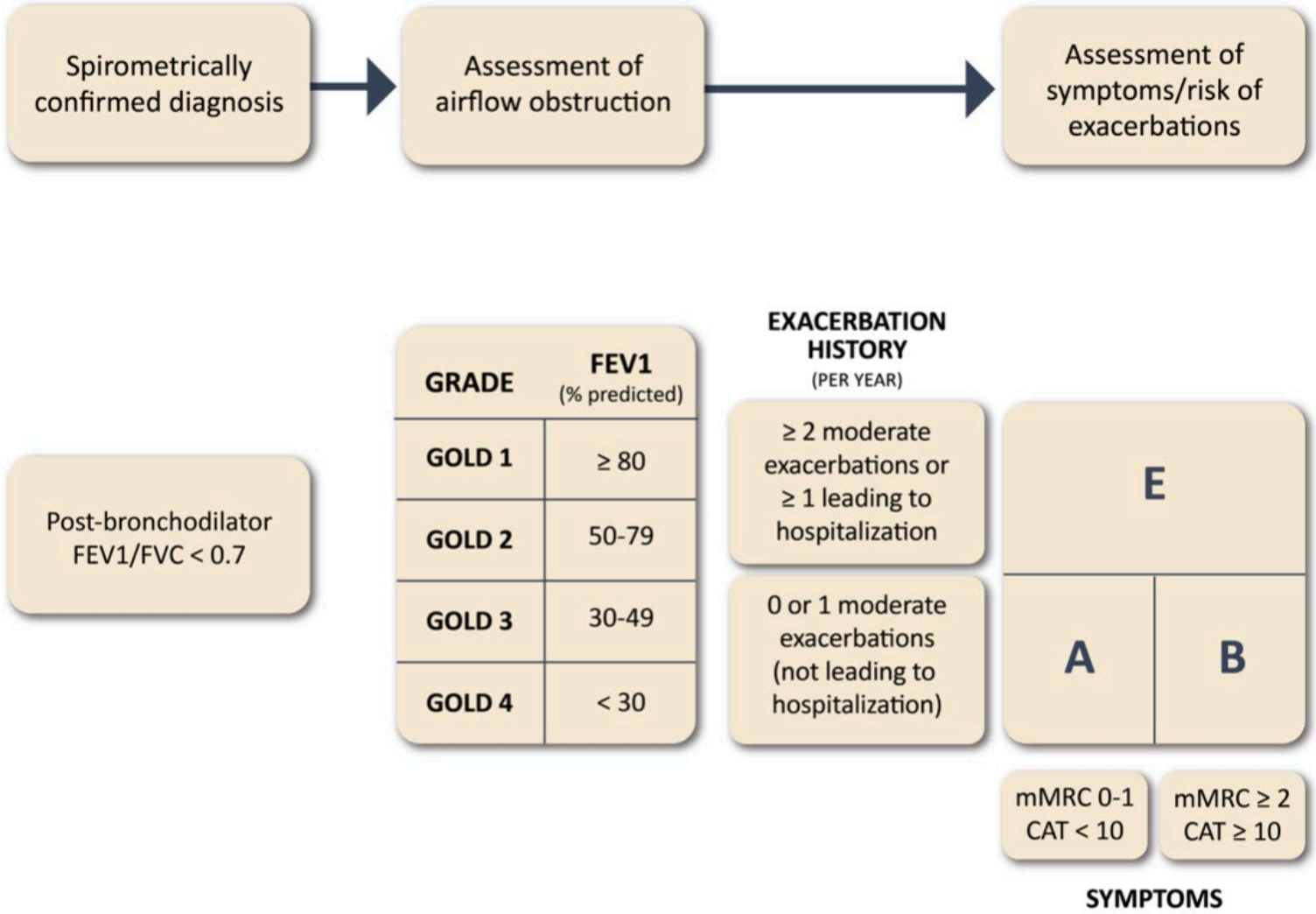
- This pattern can be associated with early restriction, early obstruction, or obesity.
- **GOLD 2024 defines as Unstable Phenotype**
  - At 3 year follow up, **1/3rd will progress on to clear obstruction** or restriction (CHEST 2011; 139(4):878–886)

- Predictors of transition : CHEST 2022; 161(3):651-661
  - Lower baseline FEV1, FEV1/FVC
  - Older age
  - Smoking
  - Females
  - Longer FET

- PRISm associated with:
  - Increased symptoms, emphysema, and exacerbations - Sci Rep 2020;10(1):5169
  - Increased mortality - AJCCM 2018;198(11):1397-1405

GOLD ABE Assessment Tool

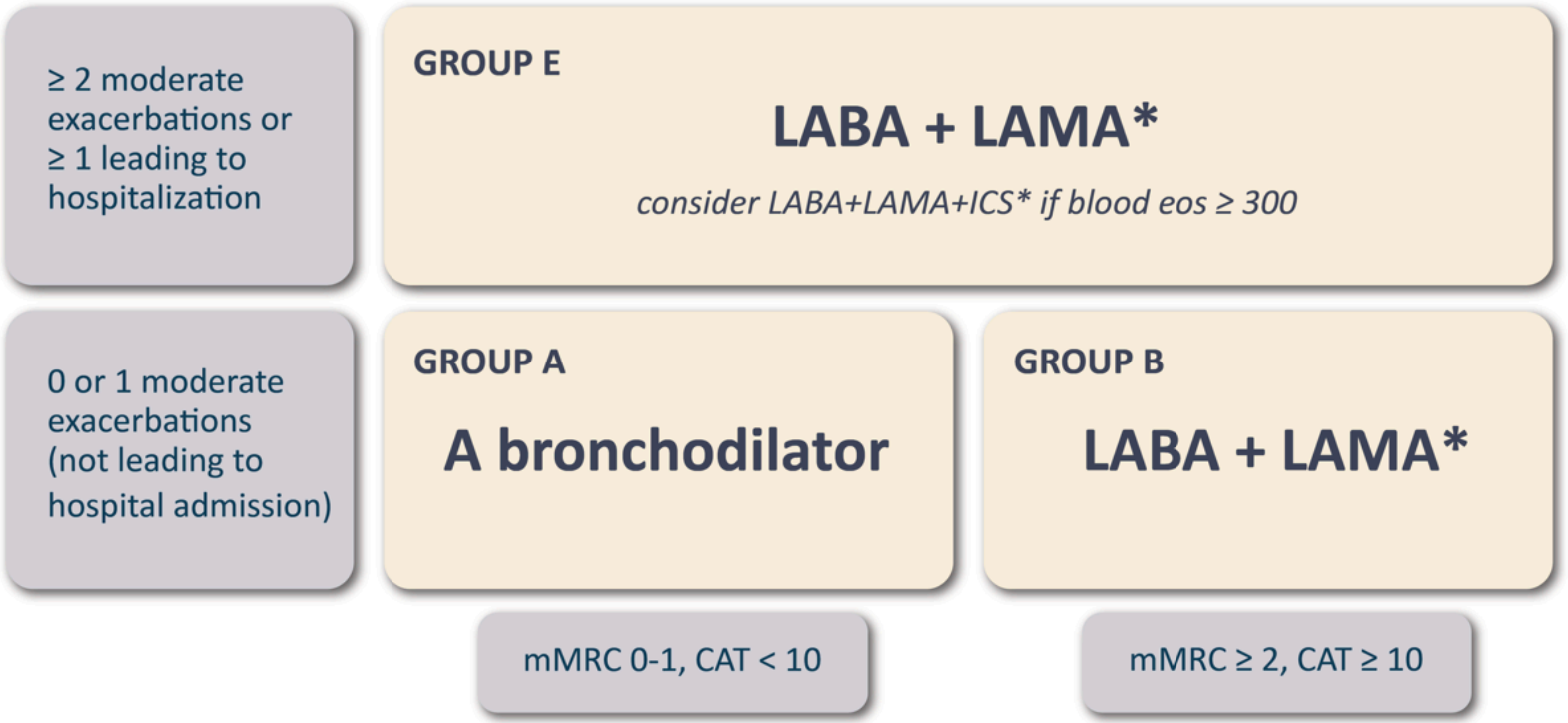
Figure 2.10



GLOBAL INITIATIVE FOR CHRONIC OBSTRUCTIVE LUNG DISEASE™

Initial Pharmacological Treatment

Figure 3.7



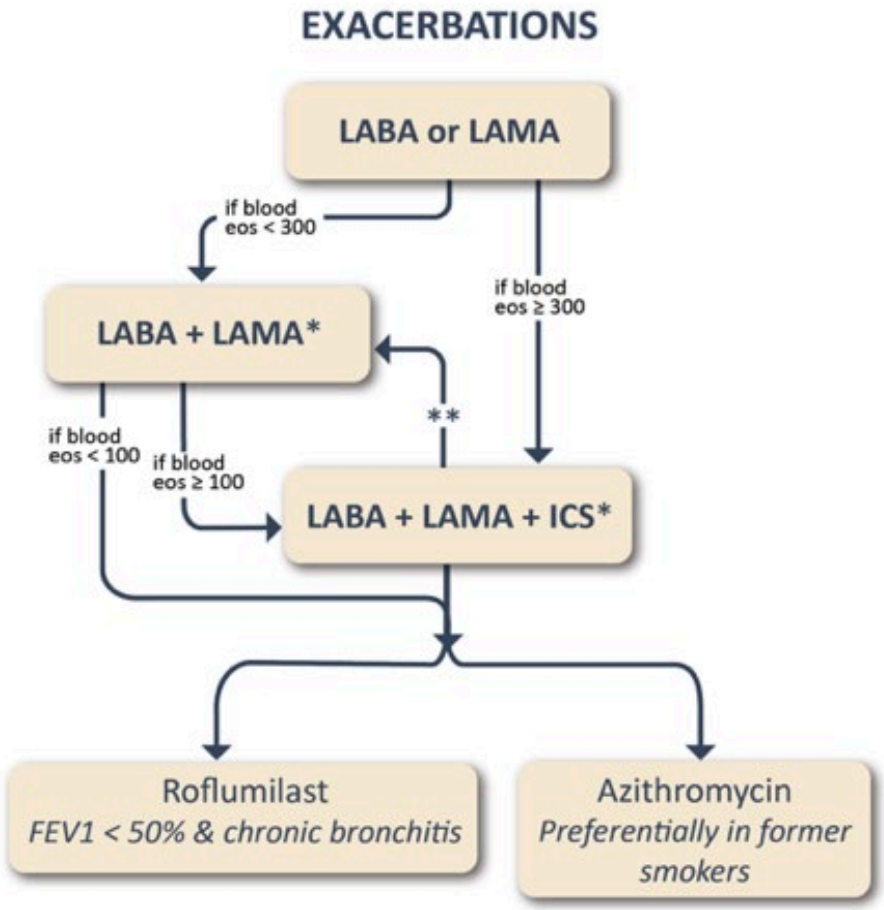
*Single inhaler therapy may be more convenient and effective than multiple inhalers; single inhalers improve adherence to treatment

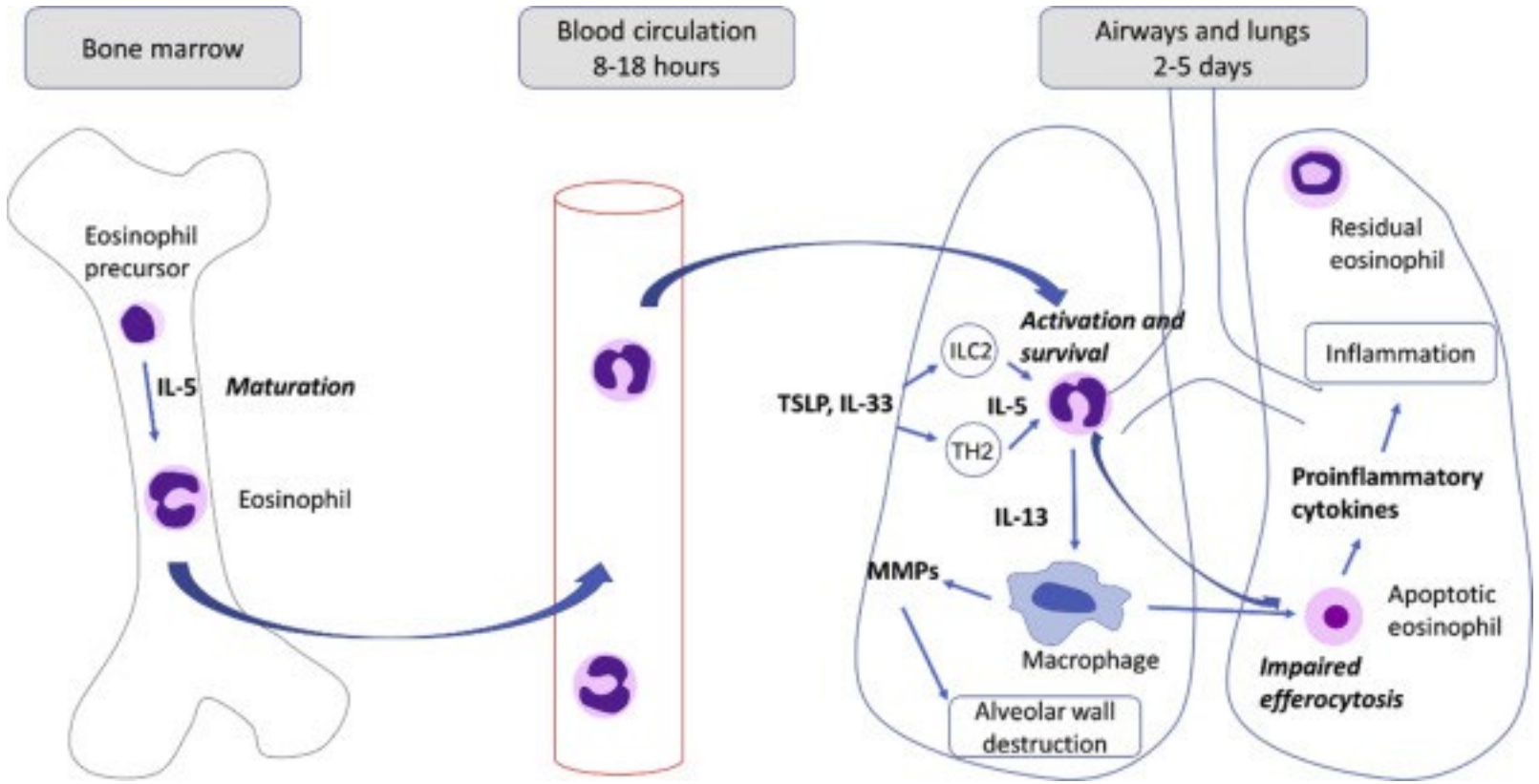
Exacerbations refers to the number of exacerbations per year; eos: blood eosinophil count in cells per microliter; mMRC: modified Medical Research Council dyspnea questionnaire; CAT™: COPD Assessment Test™.

- Regular use of SABA or SAMA improves FEV1 and sxs
- Combination SABA/SAMA are superior vs alone
- LAMA greater effect on exacerbation reduction compared to LABA
- Combination LABA and LAMA increase FEV1 and reduce sxs compared to monotherapy
- LABA + LAMA + ICS = **mortality reduction** * (IMPACT, ETHOS trials)

Follow-up Pharmacological Treatment

Figure 3.9





COPD and Eosinophilia

COPD and Eosinophilia

- Elevated blood eosinophil count can be used as **predictor** of **ICS responsiveness**

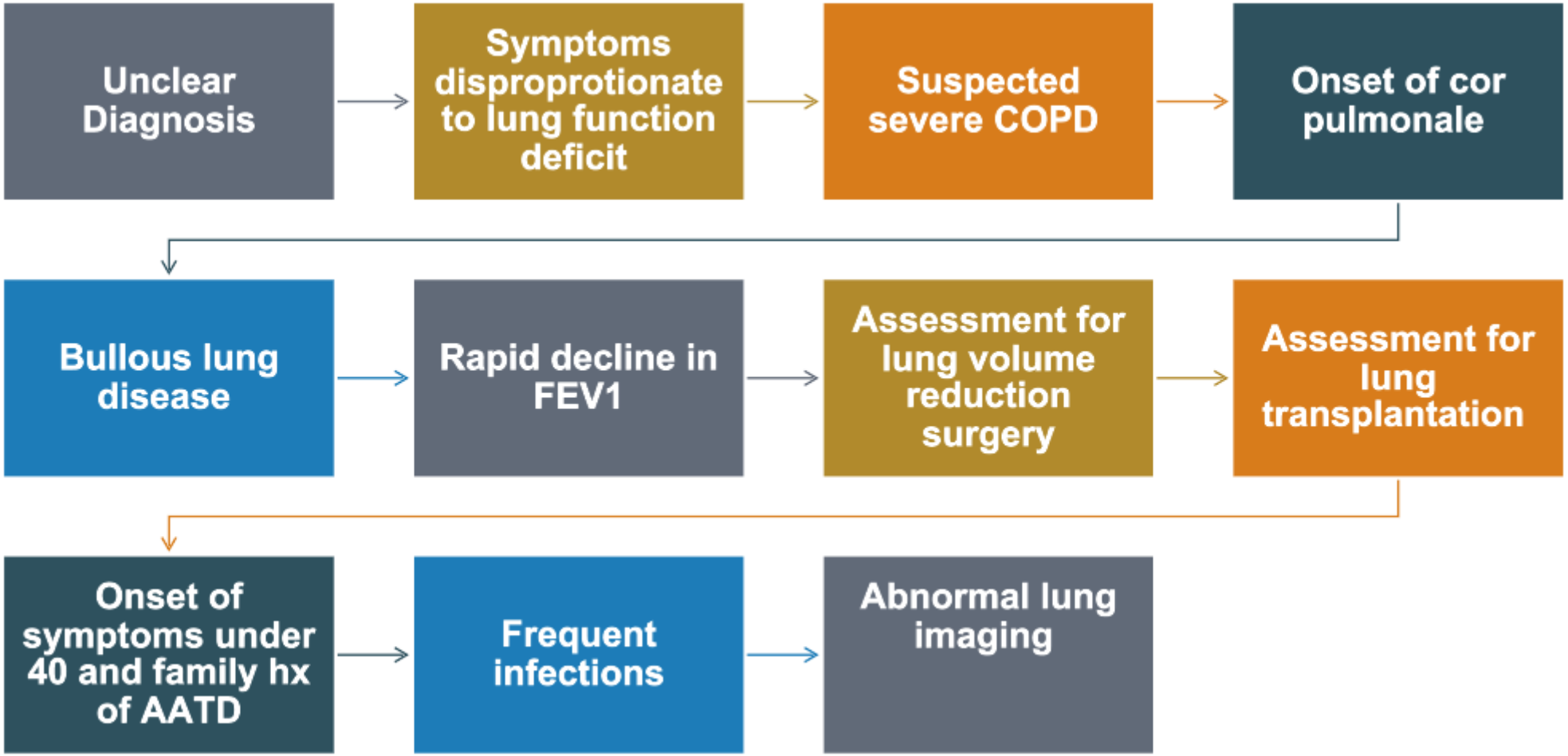
- **Dupilumab (Dupixent):** add-on maintenance treatment for adults with uncontrolled COPD with type 2 inflammation
  - reduced moderate or severe acute COPD exacerbations by 30% and 34%, (BOREAS, NOTUS trial) when compared to placebo.
  - significant lung function improvement within 12 weeks, sustained through 52 weeks

Non-Pharmacotherapy in COPD:

Reduction in Mortality:

- **Smoking Cessation**
  - All pts regardless of sxs
- **Pulmonary Rehabilitation**
  - Hospitalized for exacerbations for COPD ≤ 4 weeks after discharge
- **Long Term Oxygen therapy**
  - PaO_2 ≤55 mmHg or SaO_2 <88% or ≤60mmHg with cor pulmonale or secondary polycythemia
- **Non-invasive positive pressure ventilation**
  - Stable COPD with marked hypercapnia ($PaCO_2$ >53mmHg)
- **Lung volume reduction surgery**
  - Upper lobe emphysema, low exercise capacity

WHEN TO REFER?



Thank You