RACE AFRICA Raising COPD awareness in Africa

Doctor's training workshop

DEFINITION AND EPIDEMIOLOGY

By Prof. Ozoh
(15 minutes)

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RAISING COPD AWARENESS IN AFRICA

What is COPD?

COPD is a heterogeneous lung condition characterized by chronic respiratory symptoms (dyspnea, cough, expectoration) due to persistent abnormalities of the airways (bronchitis, bronchiolitis) and/or alveoli(emphysema), that often results in progressive airflow limitation.

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COPD has systemic effects including weight loss, nutritional abnormalities and skeletal muscle dysfunction

People with COPD are also at an increased risk of co-morbidities, including ischaemic heart disease, osteoporosis, anxiety, depression and diabetes

Introduction

Major cause of morbidity and mortality worldwide.

One of the top three causes of mortality in the global burden of disease with an estimated 328,615,000 people (168 million men and 160 million women) with this condition.

Chronic obstructive pulmonary disease (COPD) accounted for 3.23 million deaths in 2019.

COPD is the seventh leading cause of poor health worldwide (measured by disability -adjusted life years).

Safiri S et al. BMJ 2022

Meghji J, Mortimer K et al. Lancet 2021

Burden of COPD

The prevalence, morbidity & mortality varies among countries. Estimated global prevalence of 10.3%.

Tends to correlate with the prevalence of tobacco smoking

Outdoor, occupational and household air pollution (resulting from the burning of wood and other biomass fuels) are important factors.

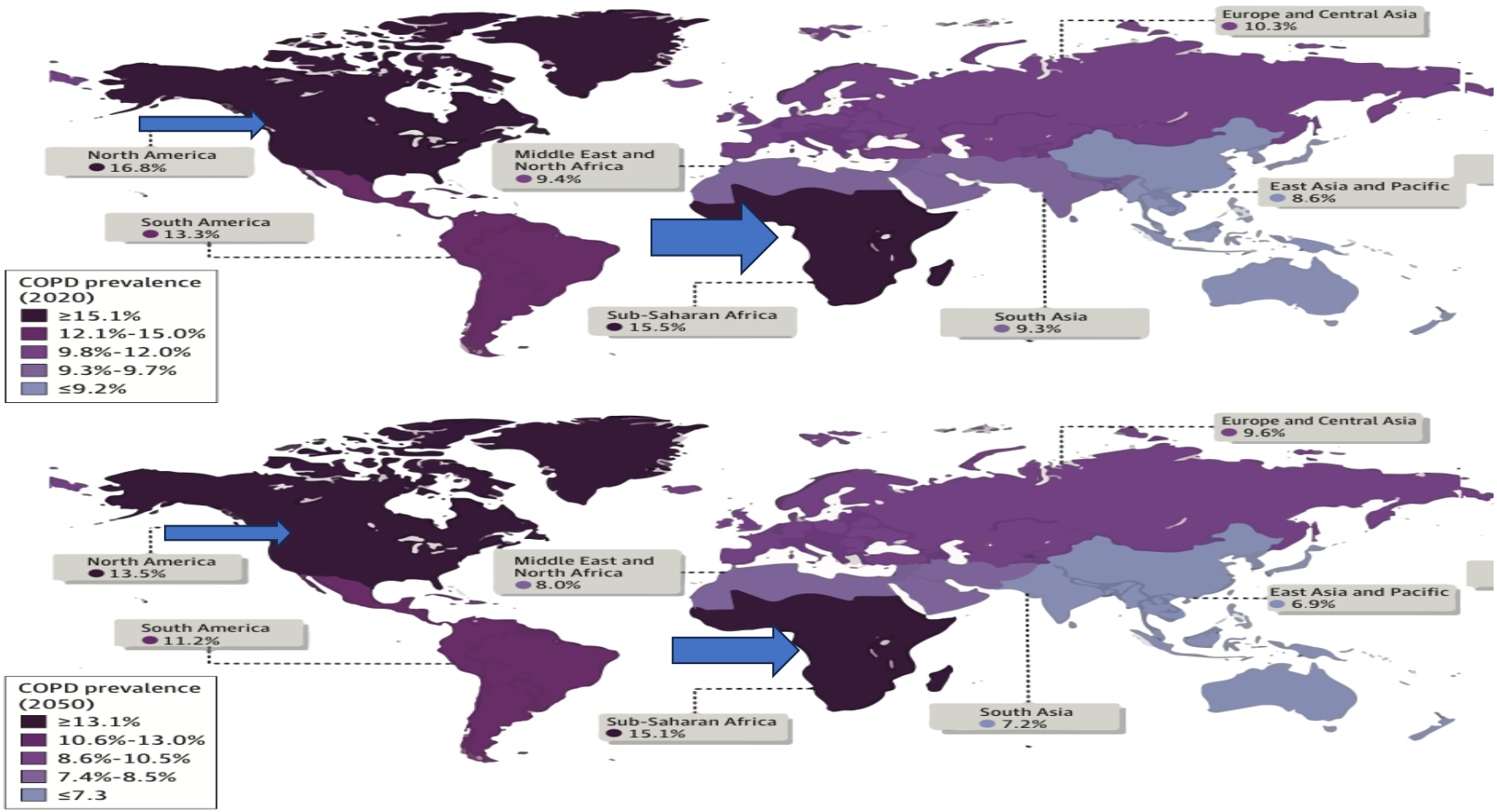
Nearly 90% of COPD deaths in those under 70 years of age occur in low- and middle-income countries (LMIC).

Prevalence and burden are projected to increase over the coming decades due to continued exposure to risk factors & ageing of the world's population – 5.4 million annual deaths by 2050.

Adeloye et al. Lancet Respir Med 2022

Boers E et al. JAMA Netw Open 2023

Burden of COPD is increasing in sub-Saharan Africa



Boers E, et al. JAMA 2023

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PMCID: PMC9521051
NIHMSID: NIHMS1838329
PMID: 36185970

Author Manuscript

Estimating the prevalence of COPD in an African country: evidence from southern Nigeria

Boni M. Ale,[1,2] Obianuju B. Ozoh,[3] Muktar A. Gadanya,[4] Yiyang Li,[5] Michael O. Harhay,[6] Akindele O. Adebiyi,[7] and Davies Adeloye[8]

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- Median prevalence of 9.2% in Nigeria.
- The median prevalence of COPD was almost the same among rural (9.5%, IQR: 7.6-10.3) and urban dwellers (9.0%, IQR: 5.3-9.3) from spirometry studies.
- Highest prevalence among oil factory workers in Southern Nigeria.

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COPD. 2016;13(1):42-9. doi: 10.3109/15412555.2015.1041102. Epub 2015 Oct 9.

Chronic Airflow Obstruction in a Black African Population: Results of BOLD Study, Ile-Ife, Nigeria

Daniel O Obaseki [1], Gregory E Erhabor [1], Louisa Gnatiuc [2], Olufemi O Adewole [1], Sonia A Buist [3], Peter G Burney [2]

Affiliations + expand

PMID: 26451840 DOI: 10.3109/15412555.2015.1041102

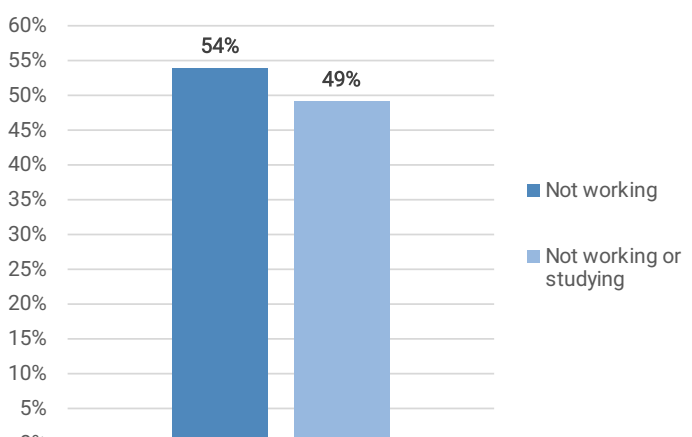
7.7% of adults ≥ 40 yrs. in Ile-Ife had chronic airflow obstruction

Economic burden of COPD

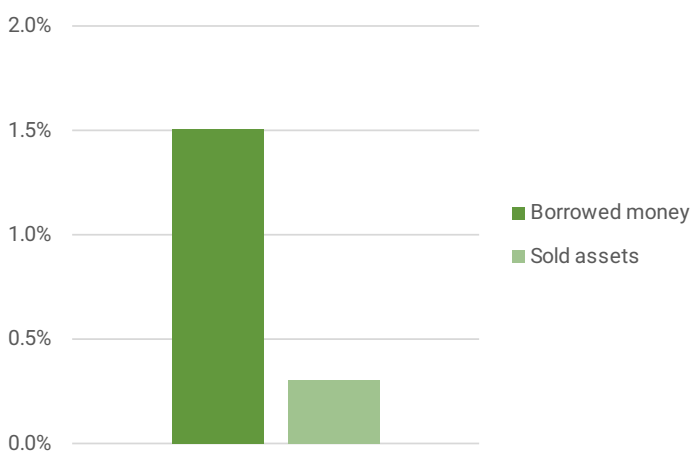
- In LMICs- impact on workplace and home.

- The GBD study 1990-2019, COPD was the primary driver of increased DALYs worldwide especially in LMICs.

Percentage not working for income



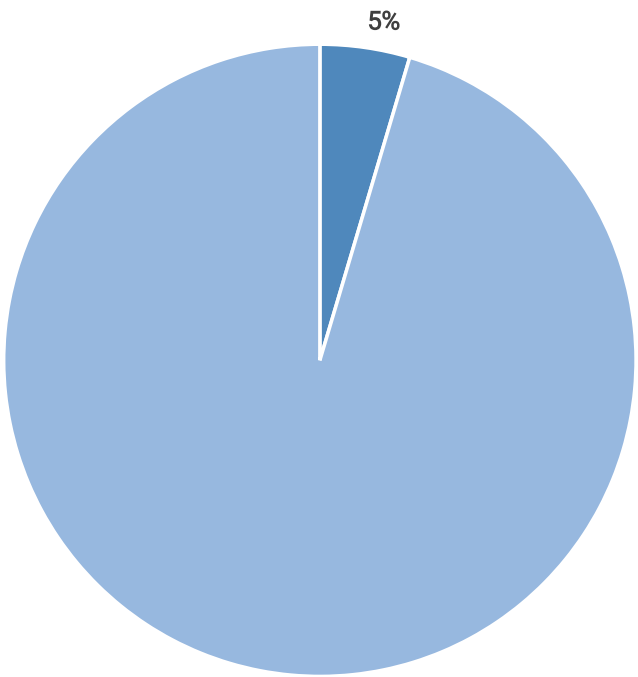
Usage of other methods to fund healthcare



CHEST Africa data (unpublished)

Cost of disease

- Direct cost



Medication and outpatient care cost as a percentage of income

CHEST Africa, preliminary. data (unpublished)

Summarize

- COPD is a disease of high burden
- It is preventable and treatable
- Burden is increasing in sSA
- There is an urgent need to increase diagnosis and treatment

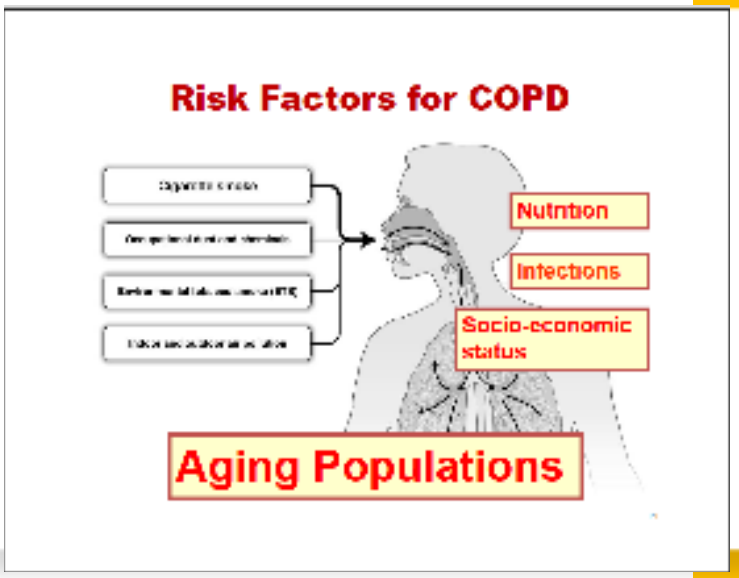
- Questions???

COPD RISK FACTORS

Prof Ozoh

Risk factors

COPD results from gene (G)-environment (E) interactions occurring over the lifetime (T) of individuals – GETnomics that can damage the lungs and/or alter their normal development / aging processes



RISK FACTORS FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Host factors	Exposures
Genetic factors	Smoking
Sex	Socio-economic state
Airway hyper reactivity	Occupation
IgE and asthma	Environmental pollution Perinatal events and childhood illness.
Infections	Recurrent Bronchopulmonary Aspergillosis
	Diet
	Indoor pollution e.g. Cooking indoors

Tobacco Smoking

Smoking is a key environmental risk factor.

Other types of tobacco (pipe, cigar, water pipe), marijuana, passive exposure to cigarette smoke, also known as environmental tobacco smoke (ETS).

Smoking during pregnancy may affect fetal lung growth and development.

Half of cases worldwide due to risk factors other than tobacco smoking.

Yang et al Lancet Respiratory medicine 2022

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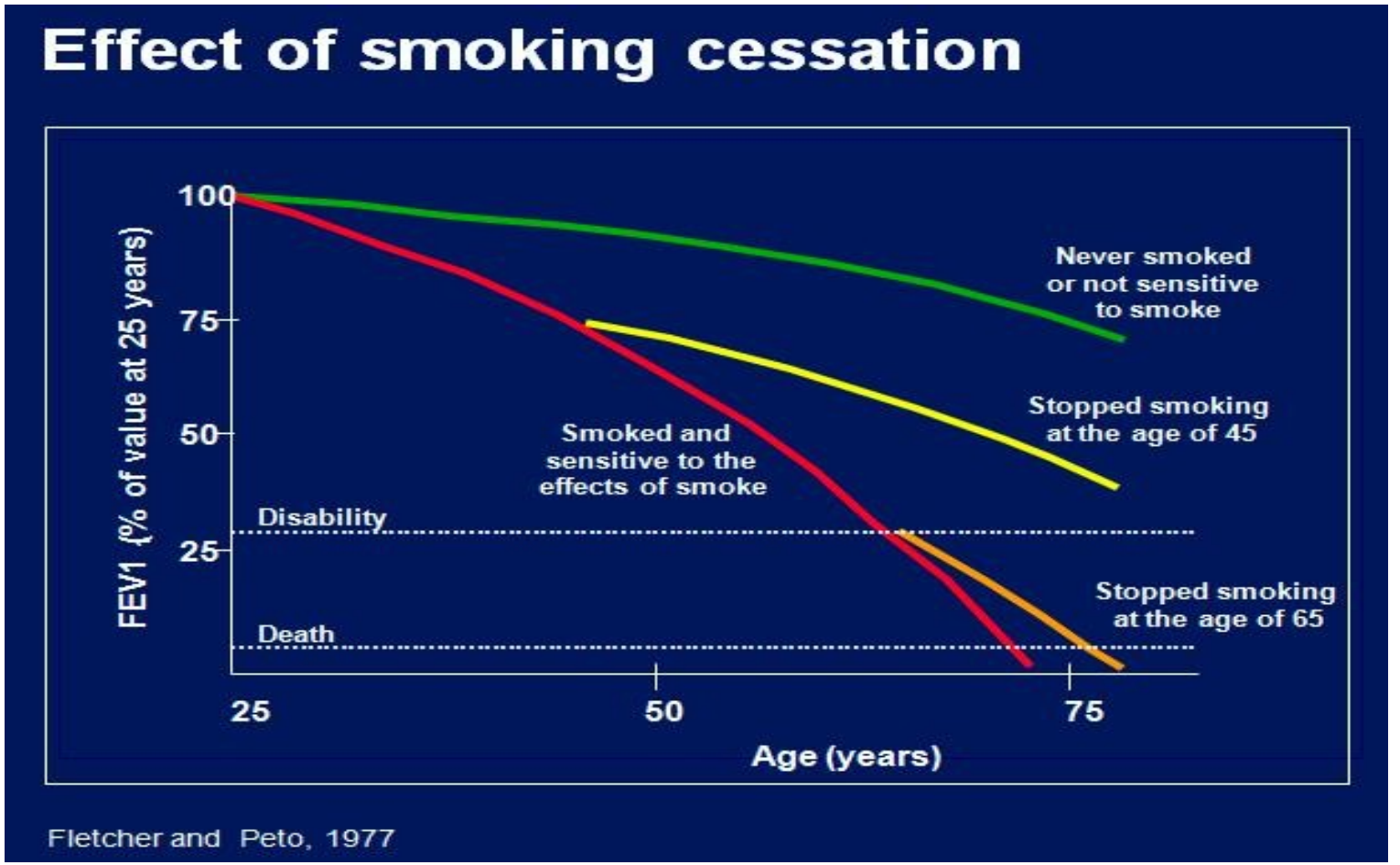


Adapted from Fletcher CM, Peto R. *Br Med J.* 1977;1:1645

Air pollution

Indoor Air Pollution: exposure to biomass fuel (wood, animal dung, crop residues, coal) used for cooking and heating is a significant risk factor, particularly among women in LMICs.

Outdoor Air Pollution: exposure to pollutants such as particulate matter (PM2.5 and PM10), ozone (O3), and nitrogen dioxide (NO2) can impair lung growth, increase the risk of COPD & predispose to exacerbations.

Risk is dose dependent.

Wang, Lulin et al. eBioMedicine 2022

Sana et al. BMJ Open Resp 2019

Doiron et al. Eur Resp Journal 2019

Occupational exposure

Exposure to organic and inorganic dust, chemicals agents (such as cadmium and silica) and fumes

Particularly high risk are gold miners, coal miners, construction workers, grain handlers, cement and cotton workers

Alif SM, Dharmage SC et al. Expert Review of Respiratory Medicine 2016

Host factors

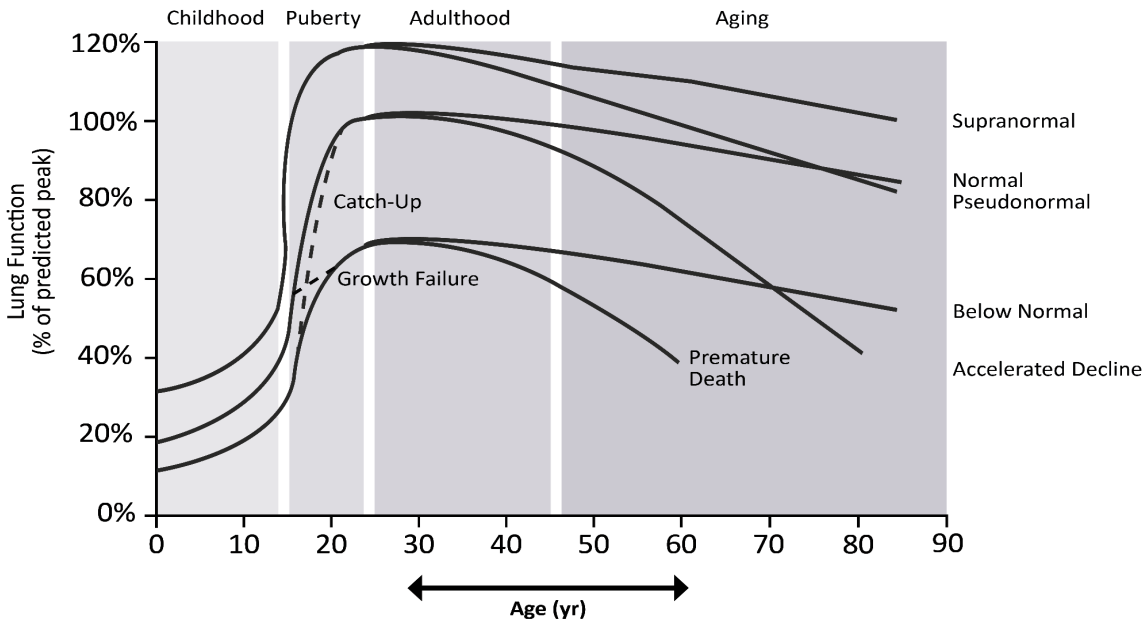
TRAJECTORY OF LUNG FUNCTION : DEVELOPMENT AND AGING

- Lung function reaches its peak at about 20-25 years , followed by a relatively short plateau and slow physiologic decline.

- Normal trajectory can be altered by events occurring during gestation, birth, childhood or adolescence affecting lung growth, shortening the plateau phase or accelerating decline.

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.

Host factors

GENETICS

- Severe hereditary deficiency of alpha-1 anti trypsin (AATD)
- 1-2 % of COPD patients
- Familial risk in people who smoke and siblings

SEX

- In the past, studies reported higher prevalence / mortality in males
- Prevalence now almost equal in males and females

A.A. Awotedu et al Afr J Med Sci. 1990

Risk factors

- **AGE**
  - Healthy aging ? Vs cumulative exposure to pollutants.
  - Mean age of 35.47 in Tanzania, Highest prevalence in people aged 30-39yrs in Uganda .

- **ASTHMA AND AIRWAY HYPER-RESPONSIVENESS**
  - Asthmatics have a 12-fold higher risk of acquiring COPD over time.
  - Airway hyper responsiveness, an independent predictor of COPD and respiratory mortality in population studies .
  - Risk of rapid decline of lung function in patients with mild COPD.

Germet et al. Lancet glo health 2015

Onesmo et al. BMC Pulm Med 2023

Ozoh et al. Ghana Med J 2023

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GMJ - Ghana Medical Journal

Ghana Med J. 2023 Sep; 57(3): 175–182.
doi: 10.4314/gmj.v57i3.3

PMCID: PMC11216736
PMID: 38957678

Journal Artic

Risk factors for chronic obstructive pulmonary disease (COPD) in a tertiary health institution in Lagos, Nigeria

Obianuju B Ozoh,[1,2] Sandra K Dede,[2] Ogochukwu A Ekete,[2] Oluwafemi O Ojo,[3] and Michelle G Dania[2]

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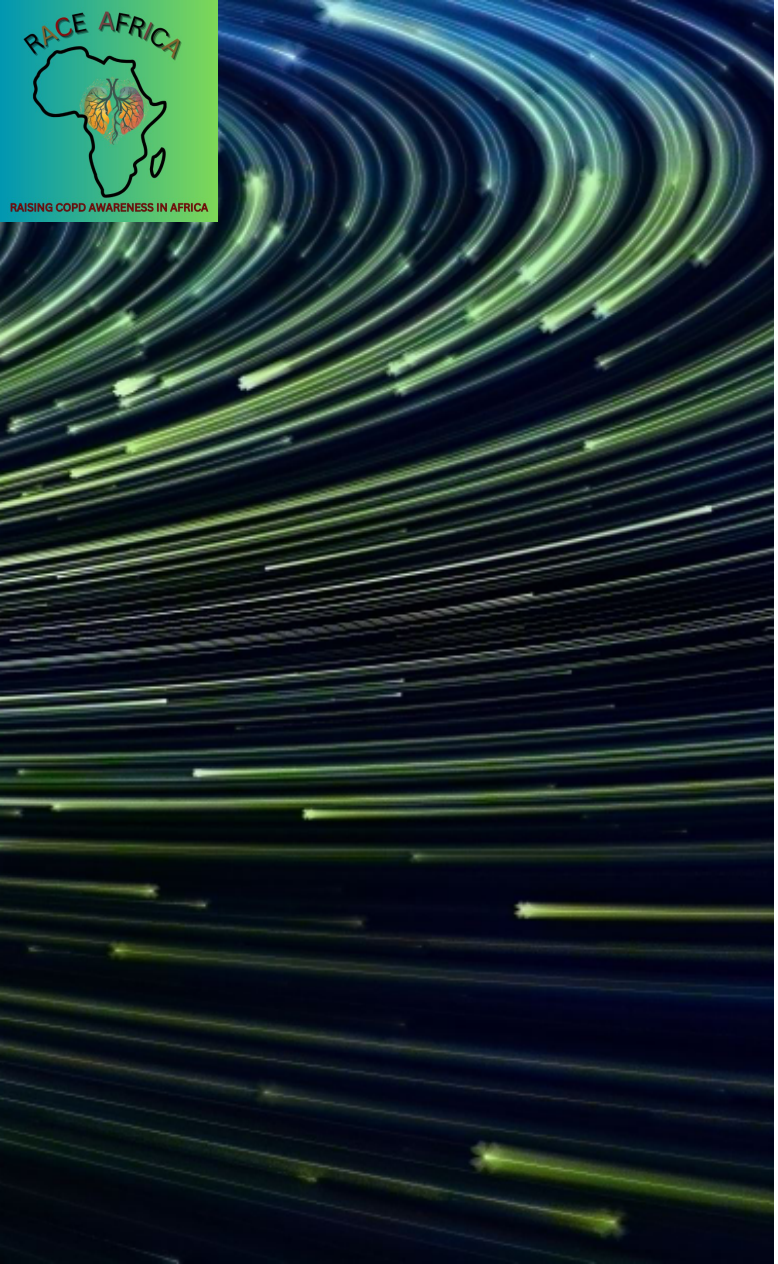
- Asthma (46.8%)
- Tobacco smoking (27.8%)
- Occupational exposure (19%)
- Biomass exposure (6.6%)
- Post-tuberculosis (3.8%)
- OTHERS; old age (3.8%) and prematurity (1.3%).



Risk factors

SOCIOECONOMIC STATUS

Poverty is consistently associated with airflow obstruction, and lower socioeconomic status is associated with an increased risk of COPD.

INFECTIONS

Severe childhood respiratory infections have been associated with reduced lung function and increased respiratory symptoms in adulthood

HIV patients are at increased risk of COPD to negative controls. Prevalence of 15.4% in JUTH.

TB is both a risk factor and potential co morbidity

Pooled prevalence of 21%, with prior PTB.

M.O Akanbi, B.O.Taiwo, O.B. Ozoh et al. 2014

Summarize

- COPD risk factors go beyond tobacco and start from gestation.
- Exposures at critical windows may set stage for future lung growth
- Many of the risk factors are linked with social disadvantages
- Stopping exposure at anytime improves outcome
- Need for community awareness

- Questions???

PATHOPHYSIOLOGY OF COPD

Dr Tekobo

Overview of pathophysiology

Results from gene (G)- environment (E) interactions occurring over the lifetime (T) of individuals – GETnomics that can damage the lungs and/or alter their normal development / aging processes

Inhalation of cigarette smoke and other noxious particles leads to chronic inflammation in the lungs

Oxidative stress, protease- anti protease imbalance, inflammatory cells and mediators modify inflammatory response

Parenchymal tissue destruction and disruption of normal repair and defense mechanisms .

Pathologic changes lead to gas trapping and progressive airflow limitation

Inflammation and narrowing of peripheral airways leads to a decline in FEV1

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Pathogenesis

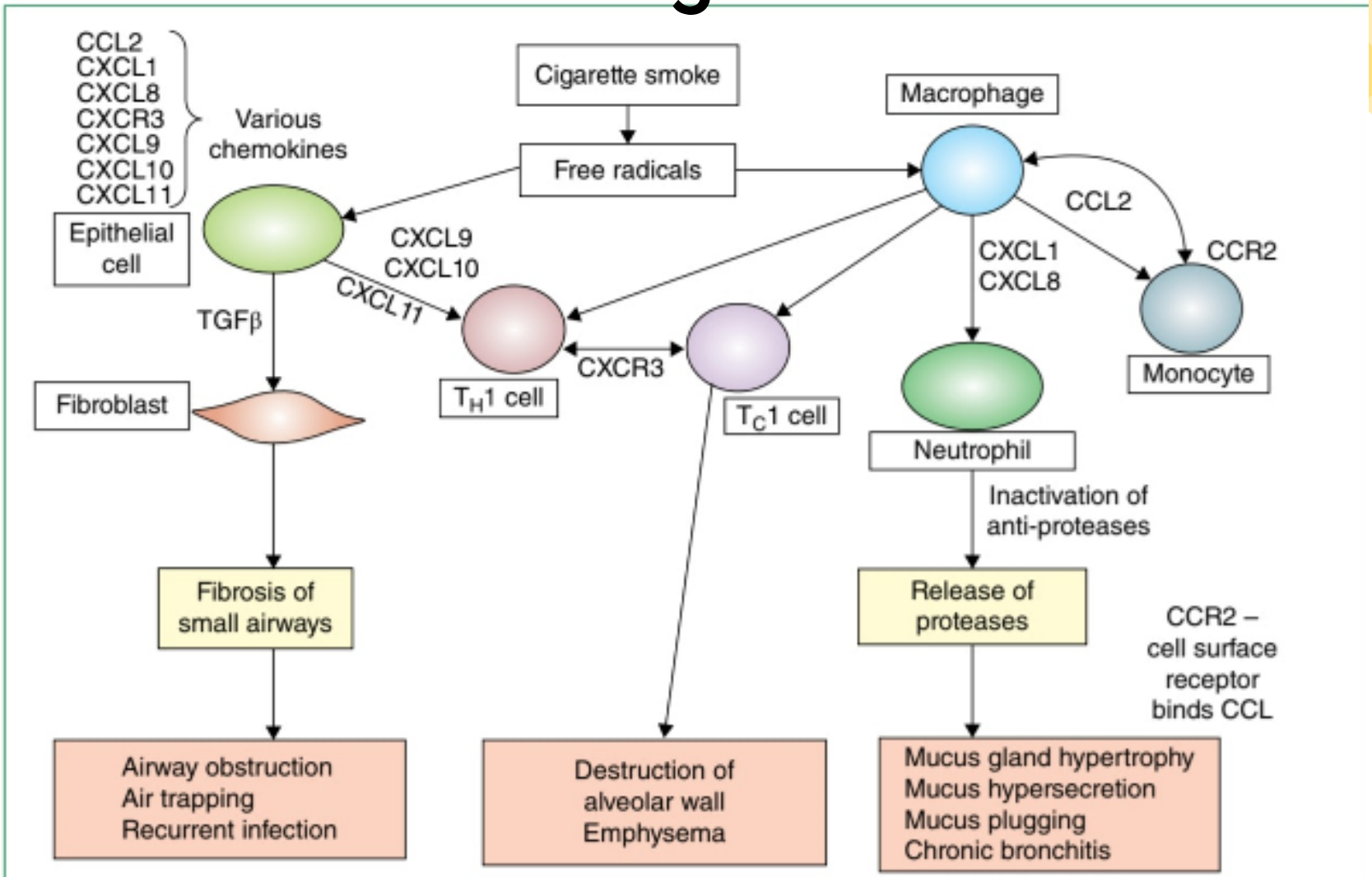

Figure 6.6 Pathophysiology of COPD.

Pathophysiology (1)

AIRFLOW OBSTRUCTION & GAS TRAPPING

- Small airway disease / parenchymal destruction
- Chronic inflammation causes structural changes, narrowing of small airways and luminal exudates
- Destruction of lung parenchyma leads to loss of elastic recoil
- Collectively, leading to limitation of lung emptying at expiration, gas trapping, hyperinflation and reduced lung volumes as measured on spirometry.

HYPERINFLATION

- Occurs due to loss of elastic recoil and expiratory flow obstruction
- Static hyperinflation occurs at rest, due to emphysema; dynamic hyperinflation occurs during exercise from airflow obstruction
- Contributes to dyspnea and impaired exercise tolerance

Pathophysiology (2)

PULMONARY GAS EXCHANGE ABNORMALITIES

- Structural abnormalities in the airways, alveoli and pulmonary circulation alter the normal ventilation perfusion distribution
- Different degree of hypoxemia, with or without hypercapnia
- Parenchymal destruction leads to reduced DLco

PULMONARY HYPERTENSION

- Abnormalities in the pulmonary circulation may include intimal hyperplasia and smooth muscle hypertrophy/ hyperplasia
- Progressive pulmonary hypertension may lead to right ventricular hypertrophy and eventual right- sided heart failure (cor pulmonale)

Pathophysiology (3)

EXACERBATIONS

- Can be triggered by a number of factor(s) alone or in combination
- Increased airway and systemic inflammation, increased gas trapping and hyperinflation with reduced expiratory flow account for increased dyspnea
- Also worsens V/Q mismatch resulting in hypoxemia, with or without hypercapnia

MULTIMORBIDITY

- Concomitant chronic comorbid diseases may be linked to same risk factors
- Inflammatory mediators in circulation contribute to weight loss / muscle wasting

- Questions???

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CLINICAL FEATURES

Dr Ogundare

Symptoms

- **Chronic dypsnea is the most characteristic symptom of COPD.**
  - It is a major cause of disability and anxiety associated with the disease.
  - It occurs particularly during exertion or physical activity.
  - Chest tightness may occur often following exertion

- **Chronic cough is often the first symptom of COPD and productive cough is present in 30% of patients.**
  - Initally intermitent and then progress to everyday.
  - There maybe significant airflow obstruction without cough.
  - Cough induced syncope may occur

- **Sputum production is common with small quantities of tenacious sputum with coughing.**
  - The presence of purulent sputum reflects an increase in inflammatory mediators.

Other symptoms

Acute events characterised by increased respiratory symptoms called exacerbations.

- This inf luence their health status and prognosis and require specific preventive and therapeutic measures.

- **Fatigue is one of the most common and distressing symptoms of COPD.**
  - It is usually described as general tiredness or feeling of being drained of energy.
  - This affects activity of daily living and quality of life.

- **Others include** weight loss, muscle mass loss, anorexia, anxiety and depression.

Physical findings

- Physical examination is an insensitive method for diagnosis of COPD.
- Widespread inspiratory or expiratory wheezes may be heard on ascultation
- An absence of wheezing or chest tightness does not exclude a diagnosis of COPD, nor does the presence of these symptoms confirm a diagnosis of asthma.
- Physical f ndings of hyperinf ated lungs such as decreased breath sounds, and hyper resonant chest percussion usually only in advanced disease.

Physical findings (2)

- May adopt positions that relieve dyspnea, such as leaning forward with arms outstretched and weight supported on the palms or elbows.

- Other signs in end stage COPD includes expiration through pursed lips, paradoxical retraction of the lower interspaces during inspiration (ie, Hoover's sign).

Summarize

- COPD symptoms are chronic but non specific
- It is important to conduct additional tests to confirm the diagnosis.

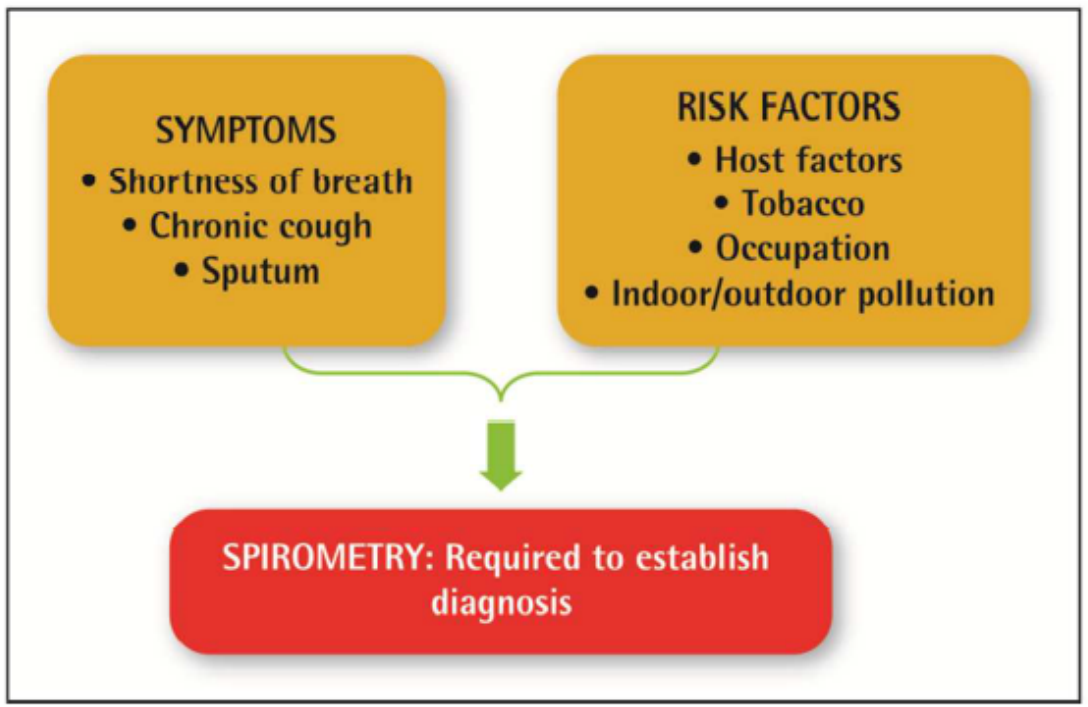
- Questions???

DIAGNOSIS

Dr Tekobo

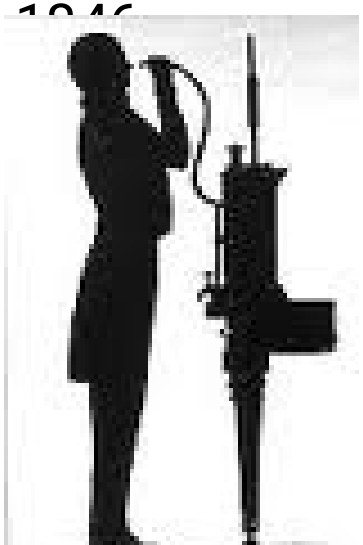
Diagnosis of COPD

Pathways to the diagnosis of COPD

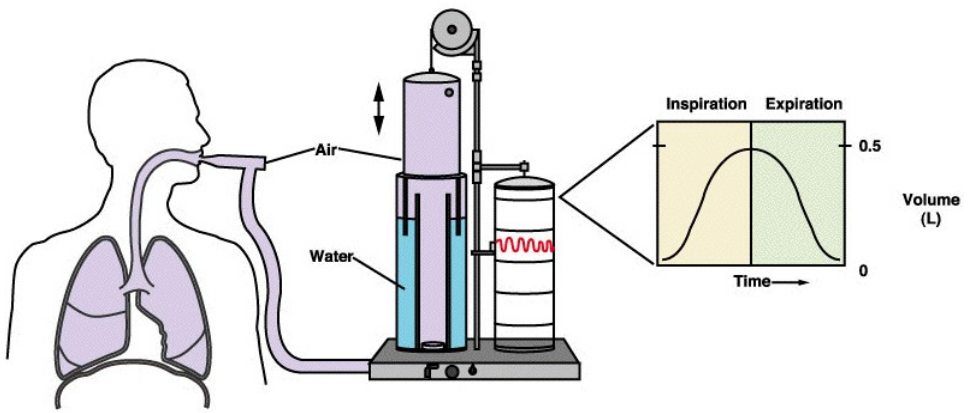


The Spirometry

Spirometry



Hutchinson



Hutchinson J. On the capacity of the lungs. Medico-Chirurgical Transactions. 1846;29:137

Investigations

- Spirometry: forced spirometry is the most reproducible and objective measurement of airflow obstruction.
  - It is non-invasive AND cheap
- OTHER TESTS:
  - Total lung volumes and capacities: increase residual lung volume and total lung capacity.
  - DLCO :The diffusing capacity for carbon monoxide is an excellent index of the degree of anatomic emphysema.
  - Chest CT scan may show airway obstruction as well as other comorbidities with shared risk factors such as lung cancer, bronchiectasis, ILD, heart failure

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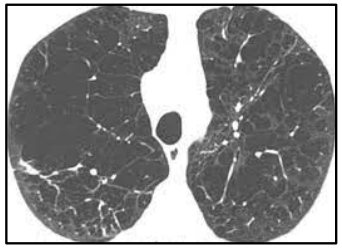
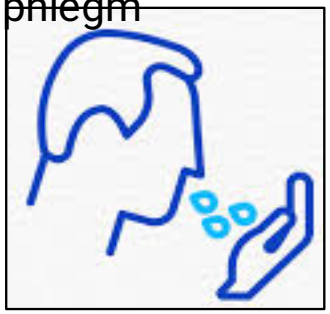
2023 GOLD INTERNATIONAL COPD CONFERENCE

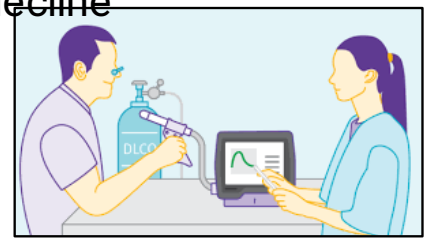
Emphysema



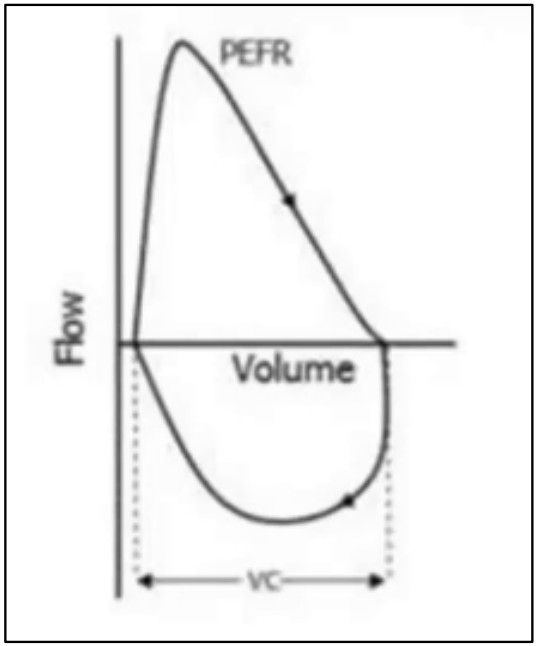
Cough and phlegm



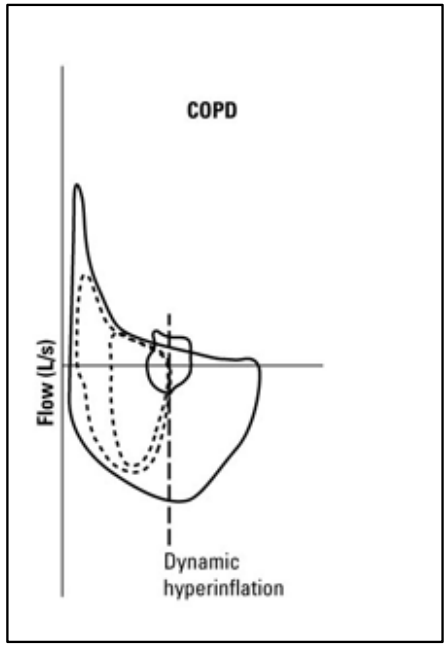
Low Dlco and Rapid FEV_1 decline



Normal



COPD



FEV1/FVC <0.7 or LLN

Harvey BG, et al Eur Respir J. 2015;46:1589
Fortis S et al. Sci Rep 2020;10:5169
Allinson JP, et al AJRCCM 2016;193:662
Petersen H, et al 2018;198:1449

Lung Center
Temple Health

- A chest Xray is not needed to confirm a diagnosis of COPD.

- It could be done to assess for comorbidities.

- Typically in COPD it shows: hyperinflation, flattened diaphragm, narrow mediastinum.

Differential Diagnosis of COPD

Figure 2.3

Diagnosis	Suggestive Features
COPD	Symptoms slowly progressive History of tobacco smoking or other risk factors
Asthma	Variable airflow obstruction Symptoms vary widely from day to day Symptoms worse at night/early morning Allergy, rhinitis, and/or eczema also present Often occurs in children Family history of asthma
Congestive heart failure	Chest X-ray shows dilated heart, pulmonary edema Pulmonary function tests indicate volume restriction, not airflow obstruction
Bronchiectasis	Large volumes of purulent sputum Commonly associated with bacterial infection Chest X-ray/HRCT shows bronchial dilation
Tuberculosis	Onset at all ages Chest X-ray shows lung infiltrate Microbiological confirmation High local prevalence of tuberculosis
Obliterative bronchiolitis	Can occur in children Seen after lung or bone marrow transplantation HRCT on expiration shows hypodense areas
Diffuse panbronchiolitis	Predominantly seen in patients of Asian descent Most patients are male and nonsmokers Almost all have chronic sinusitis Chest X-ray & HRCT show diffuse small centrilobular nodular opacities & hyperinflation

These features tend to be characteristic of the respective diseases, but are not mandatory. For example, a person who has never smoked may develop COPD (especially in LMICs where other risk factors may be more important than cigarette smoking).

Summarize

Spirometry is the gold standard investigation for confirming a diagnosis of COPD.

A post bronchodilator airway obstruction (FEV1/FVC <0.7 or LLN) on spirometry, in the presence of characteristic symptoms (including exacerbations) confirms clinically relevant COPD

- Questions???

Evaluating the patient with COPD: THE ROLE OF GUIDELINES/STRATEGY

Dr Ozoh

Global Initiative for Chronic Obstructive Lung Disease

2024 REPORT

Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease

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The role of guidelines

Pros

- Statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options
- Provide standardized, high-quality care that improves health and reduces mortality regardless of health provider and geographical location
- Confidence on the appropriateness of care
- Practice audits
- Medico-legal protection.
- Empowers patients to make informed health decisions and demand for recommended care.
- Advocacy tools to influence policy, unprioritized health problems, unavailable health services, neglected patient populations and high-risk groups

Drawback

- May not consider individual patient needs and may be inappropriate for some patients.
- Suicide prevention adherence to guidelines has led to missed opportunities to prevent events
- Potential for flaw in the evidence-base for guideline development and the subjectivity and power of the developers.

Assessment

The goals of COPD assessment to guide therapy are:

- To determine the level of airflow limitation
- To define its impact on the patient's health status
- Identify the risk of future events (such as exacerbations, hospital admissions or death).

To achieve these goals, we need:

- Current nature and magnitude of symptoms
- History/future risk of exacerbations
- Presence of comorbidities

ASSESMENT

SPIROMETRICALLY CONFIRMED DIAGNOSIS → ASSESMENT OF AIRFLOW OBSTRUCTION → ASSESMENT OF SYMPTOMS/ RISK OF EXACERBATION

Post bronchodilator FEV1/FVC < 0.7

GRADE	FEV1 (% Predictec)
GOLD 1	> 80
GOLD 2	50-79
GOLD 3	30-50
GOLD 4	<50

EXACERBATION HISTORY (per year)

	SYMPTOMS	
	mMRC 0-1 CAT < 10	mMRC ≥ 2 CAT ≥10
0 exacerbation	A	B
≥ 1 moderate or severe exacerbations	E	

Adapted from GOLD 2024

Modified MRC Dyspnea Scale

Figure 2.8

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: ATS (1982) Am Rev Respir Dis. Nov;126(5):952-6.

CAT™ Assessment

Figure 2.9

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	1	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:

COPD Assessment Test 2

CAT Score	Impact Level	Clinical Picture	Management Considerations
>30	Very high	• Daily activities are limited • Patients feel restricted and cannot leave the house	• Referral to specialist care • Consider additional pharmacological treatments • Referral for pulmonary rehabilitation • Ensure best approaches to minimise and manage exacerbations
>20	High	• COPD prevents most activities • Patients maybe breathless when they talk • Chest symptoms disturb sleep • Patients are afraid and panic	
10-20	Medium	• COPD is one of the patient's most important problems • Patients have cough with sputum on most days and 1-2 exacerbations per year • Patients are breathless on most days	• Review maintenance therapy • Referral for pulmonary rehabilitation • Review risk factor exposure • Ensure best approaches to minimise and manage exacerbations
<10	Low	• COPD causes a few problems • Patients usually cough several days a week and are breathless upon exertion	• Smoking cessation • Annual influenza vaccination • Therapy as warranted by further clinical assessment

Assessment of exacerbation risk

- The best predictor of frequent exacerbations (defined as ≥ 1 exacerbations per year) is a history of earlier treated events
- Hospitalization for a COPD exacerbation has a poor prognosis and an increased risk of death
- Blood eosinophil count
  - A biomarker of exacerbation risk in patients with a history of exacerbations
  - Can predict the effects of ICS on exacerbation prevention.

Chan MC. Int J Chron Obstruct Pulmon Dis. 2020

Harries TM. Resp research 2020

Chen F. PLOS ONE 2024

Assessment of comorbidities

- Cardiovascular disease
- Osteoporosis
- Malignancy
- Diabetes
- Anxiety and Depression
- Obstructive sleep apnea
- Bronchiectasis
- Gastro-esophageal reflux

Additional investigations

- WHO recommends screening for alpha 1 antitrypsin (<20%)
- Imaging
- Lung volume and diffusing capacity
- Pulse oximetry
- Arterial blood gas
- Exercise testing

ASSESMENT

SPIROMETRICALLY CONFIRMED DIAGNOSIS → ASSESMENT OF AIRFLOW OBSTRUCTION → ASSESMENT OF SYMPTOMS/ RISK OF EXACERBATION

Post bronchodilator FEV1/FVC < 0.7

GRADE	FEV1 (% Predictec)
GOLD 1	> 80
GOLD 2	50-79
GOLD 3	30-50
GOLD 4	<50

EXACERBATION HISTORY (per year)

- ≥ 1 moderateor severe exacerbations → E
- 0 moderate or severe exacerbation → A / B

SYMPTOMS

- A: mMRC 0-1, CAT < 10
- B: mMRC ≥ 2, CAT ≥10

Adapted from GOLD 2024

Summarize

- After diagnosis of COPD, it is essential to assess the patient to guide the choice of initial treatment.
- This is based on assessing symptoms, severity of airflow obstructions, exacerbation history and comorbidities.

- Questions???

TREATMENT OF STABLE COPD

Dr Ogundare

Goals of treatment

Reduce symptoms

Relieve symptoms

Improve exercise tolerance

Improve health status

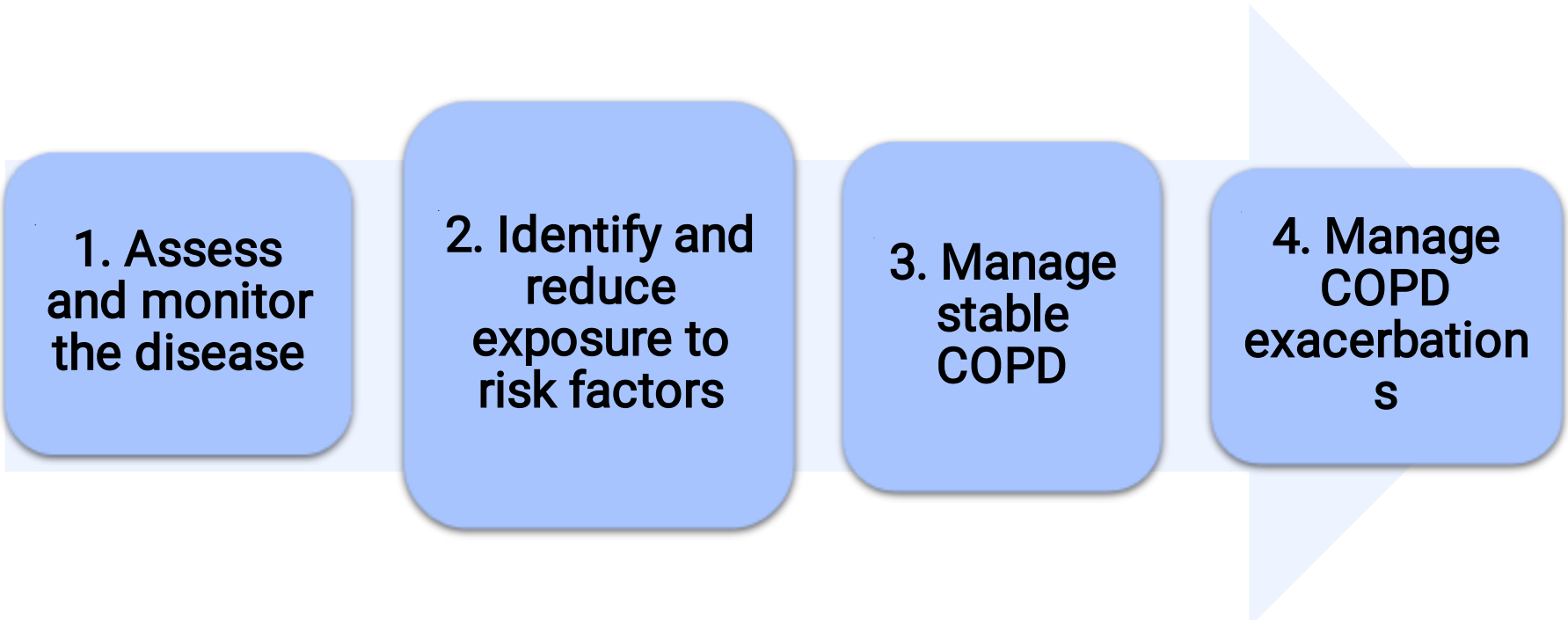
Reduce risk

Prevent disease progression

Prevent and treat exacerbations

Reduce mortality

The four major components of COPD management



Component Two: Reduction of risk factors

- Smoking cessation is the single most effective and (and cost-effective) intervention to reduce the risk of developing COPD and slow its progression

- Strategies used to assist patients in smoking cessation include:
  - **ASK** – systematically identify all tobacco users at each visit
  - **ADVISE** – strongly advise all tobacco users to quit at each visit
  - **ASSESS** – determine the willingness to attempt to quit smoking
  - **ASSIST** – provide medication to aid quitting
  - **ARRANGE** – schedule follow-up contact

Component Two: Reduction of risk factors – reasons to quit smoking

- Reduce the risk of COPD progression
- Reduce the risk of developing other diseases, e.g. heart disease
- Protect the health of those around you
- Improve fertility levels
- Improve breathing, general fitness and quality of life
- Improve the appearance of skin and teeth

Component Two: Reduction of risk factors – other risk factors

Occupational exposure

- Emphasise the importance of eliminating or reducing exposure to various substances in the workplace, including organic and inorganic dusts, and chemical agents and fumes
- Improving ventilation can minimise exposure to irritant particles

Indoor pollution

- Implement measures to reduce biomass fuel burning and reduce exposure to tobacco smoke
- Improved ventilation, cleaner energy sources and increased public awareness are all strategies to reduce indoor pollution

Outdoor pollution

- Advise patients to monitor public announcements of air quality
- Depending on the severity of disease, avoid vigorous exercise or stay indoors altogether during periods of high pollution, dust and sandstorms

MANAGEMENT OF COPD

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RAISING COPD AWARENESS IN AFRICA

Diagnosis

- Symptoms
- Risk factors
- Spirometry (repeat if borderline)

Initial Assesment

- FEV1 – GOLD 1-4
- Symptoms (CAT or mMRC)
- Exacerbation history
- Smoking status
- Blood eosinophil count
- ∝ 1- antitrypsin
- Co morbidities

Initial Management

- Smoking cessation
- Vaccination
- Active lifestyle and exercise
- Initial pharmacotherapy
- Self management education
  - Risk factor management
  - Inhaler technique
  - Breathlessness
  - Written action plan
- Manage co morbidities

Review

- Symptoms (CAT or mMRC)
- Exacerbation
- Smoking history
- Exposure to other risk factors
- Inhaler technique & adherance
- Physical activity & exercise
- Need for pulmonary rehabilitation
- Self management skills
  - Breathlessness
  - Written action plan
- Need for oxygen, NIV, lung volume reduction, palliative approaches
- Vaccination
- Management of co morbidities
- Spirometry (at least annually)

Adjust

- Pharmacotherapy
- Non-pharmacological therapy

Adapted from GOLD 2024

INITIAL PHARMACOLOGICAL TREATMENT

≥ 1 moderate or severe exacerbations

GROUP E

LABA + LAMA*

Consider LABA + LAMA + ICS if blood eos ≥ 300*

0 moderate or severe exacerbation

GROUP A

A bronchodilator

mMRC 0-1, CAT < 10

GROUP B

LABA + LAMA*

mMRC ≥ 2 , CAT ≥ 10

*Single inhaler thearpy may be more conviniet than mutliple inhalers. Improves adherance to treatment

mMRC: modified medical research council dyspnea questionniare CAT™: COPD Assesment test™

Adapted from GOLD 2024

Factors to consider when initiating treatment

Factors to consider when adding ICS to long-acting bronchodilators:
(note the scenario is different when ICS withdraw)

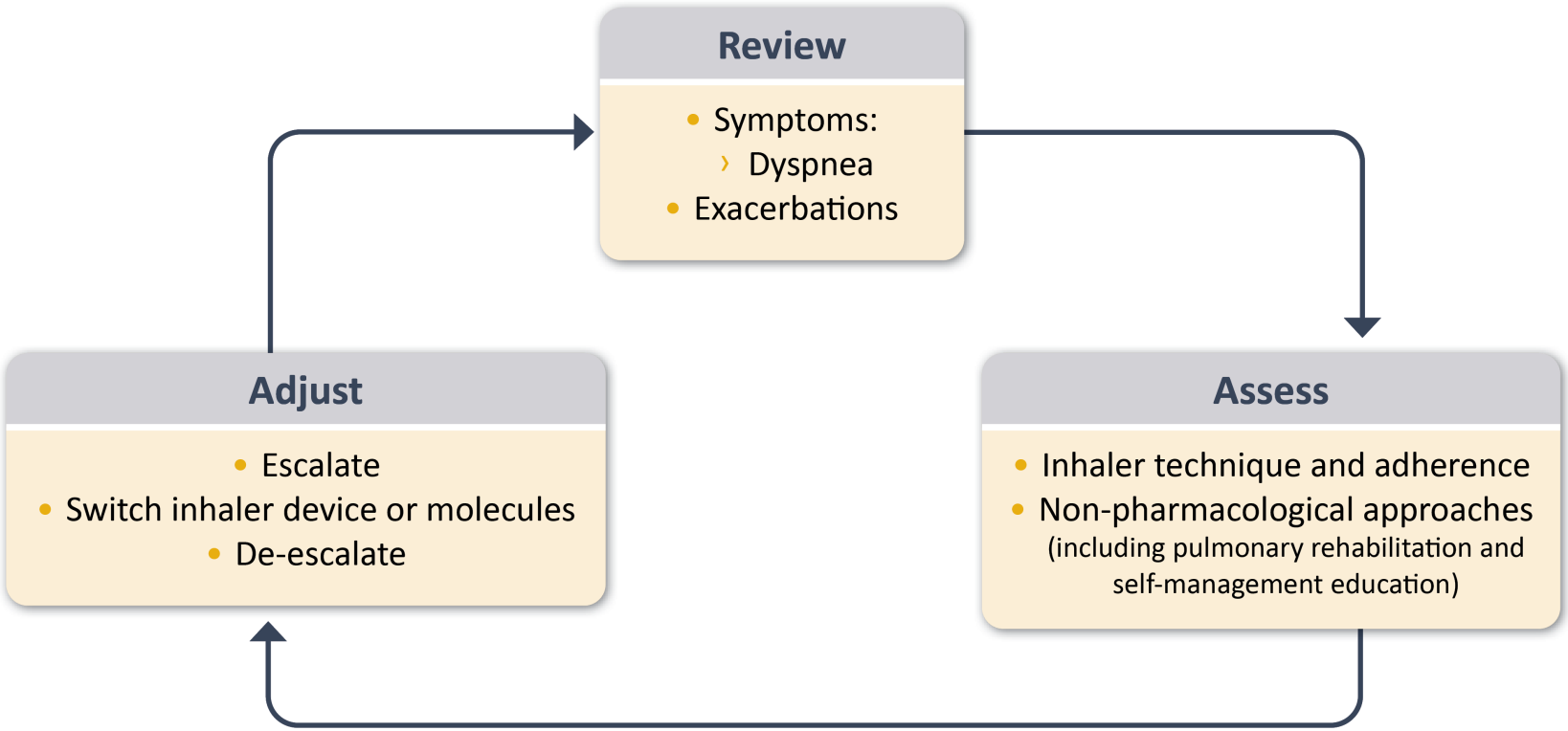
Strongly favors use	History of hospitalization(s) for exacerbations of COPD[#] ≥2 moderate exacerbations of COPD per year[#] Blood eosinophils ≥300 cells.µL^{-1}
favors use	1 moderate exacerbation of COPD per year[#] Blood eosinophils 100 <300 cells· µL^{-1}
Against use	Repeated pneumonia events Blood eosinophils 100 <300 cells· µL^{-1} History of mycobacterial infection

*: despite appropriate long-acting bronchodilator maintenance therapy (see figure 4 and GOLD report Table 3.4 for recommendations). Note that blood eosinophils should be seen as a continuum; quoted values represent approximate cut points; eosinophil counts are likely to fluctuate.

Adapted from and reproduced with permission from [103].

Management Cycle

Figure 3.8



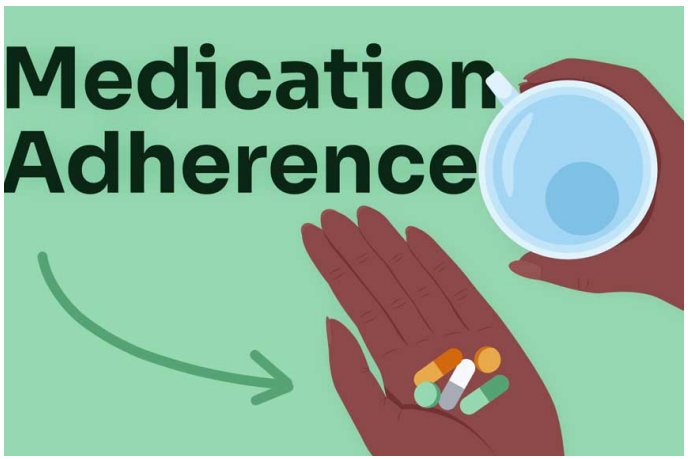
Review symptoms

- At each visit, information on symptoms since the last visit should be collected, including cough and sputum.
- Breathlessness, fatigue, activity limitation, and sleep disturbances.
- Questionnaires such as the COPD Assessment Test (CAT™) can be used; trends and changes are more valuable than single measurements.

Check adherence and appropriate use of medications

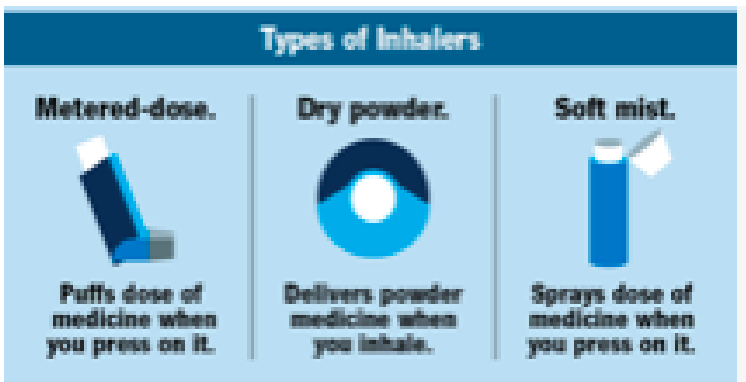
The following aspects needs careful and personalized attention:

- Dosages of prescribed medications
- Adherence to the regimen
- Inhaler technique
- Effectiveness of the current regime
- Side effects



Inhalers and inhaler techniques

- Shared decision making is the most appropriate strategy for inhalation device choice.
- Patients' beliefs, satisfaction with current and previous devices and preferences need to be assessed and considered.
- Patient errors with inhaler use are common, such as inhaling too sharply, at the wrong time and not holding their breath long enough after inhaling the contents.
- Types of inhalers



Inhaler technique

The f ive-step plan below provide consistent and accurate education on inhaler technique

1. Prepare the device	2. Prepare the body	3. Place mouthpiece in mouth	4. DPI	5. MDI
• Check the orientation • Actuate the device • Shake the device if it is an MDI	• Breathe out fully away from the mouthpiece • Consider differences between MDI and DPI devices	• Ensure a good seal and make sure the teeth are not in front of the device	• Breathe as fast and as hard as possible from the beginning OR	• Start breathing slowly and actuate. Breathe in over 5 seconds and hold breath for 5 seconds

FOLLOW UP PHARMACOLOGICAL TREATMENT

IF RESPONSE TO INITIAL THERAPY APPROPRAITE, MAINTAIN IT

IF NOT, REASSESS : Inhaler technique, adehrance, co-morbidities, consider predominant treatable trait to target

DYSPNEA

LABA or LAMA

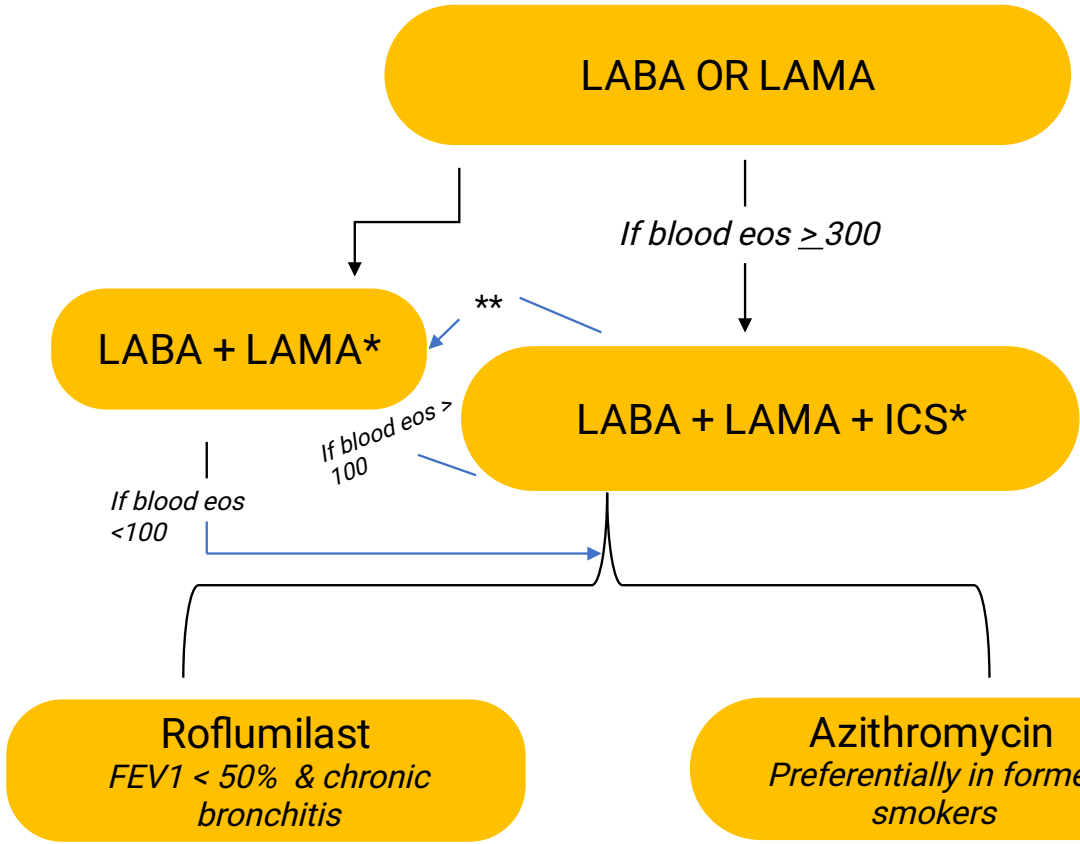
↓

LABA + LAMA

↓

- Consider switching inhaler device or molecule
- Implement or esclate non pharmacolgical treatment(s)
- Investigate (and treat) other causes of dyspnea

EXACERBATIONS



* Single inhaler therapy may be more convinient and effective than multiple inhalers. Single inhalers improve adherance to treatment

** Consider deescalation of ICS if pneumonia or other considerable side effects. De escalation more likely to result in exacerbation if blood eos ≥ 300 cells / µl

Adapted from GOLD 2024

Non-Pharmacological Management of COPD*

Figure 3.12

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

Prescription of Supplemental Oxygen to COPD Patients

Arterial hypoxemia defined as:
$PaO_2 \leq 55$ mmHg (7.3 kPa) or $SaO_2 < 88\%$
Or
$PaO_2 > 55$ but < 60 mmHg (.> 7.3 kPa but < 8 kPa)
with right heart failure or erythrocytosis

↓

Prescribe supplemental oxygen
and titrate to keep $SaO_2 \geq 90\%$

↓

Recheck in 60 to 90 days to assess:
- If supplemental oxygen is still indicated
- If prescribed supplemental oxygen is effective

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Summarize

Managing COPD is a cycle of Reassessment and revision if needed.

Inhaled medicines are the backbone, hence inhaler techniques is fundamental to effectiveness of treatment

Nonpharmacological treatment are as important

- Questions???

MANAGEMENT OF ACUTE EXACERBATION OF COPD (AECOPD)

Dr Tekobo

Definition

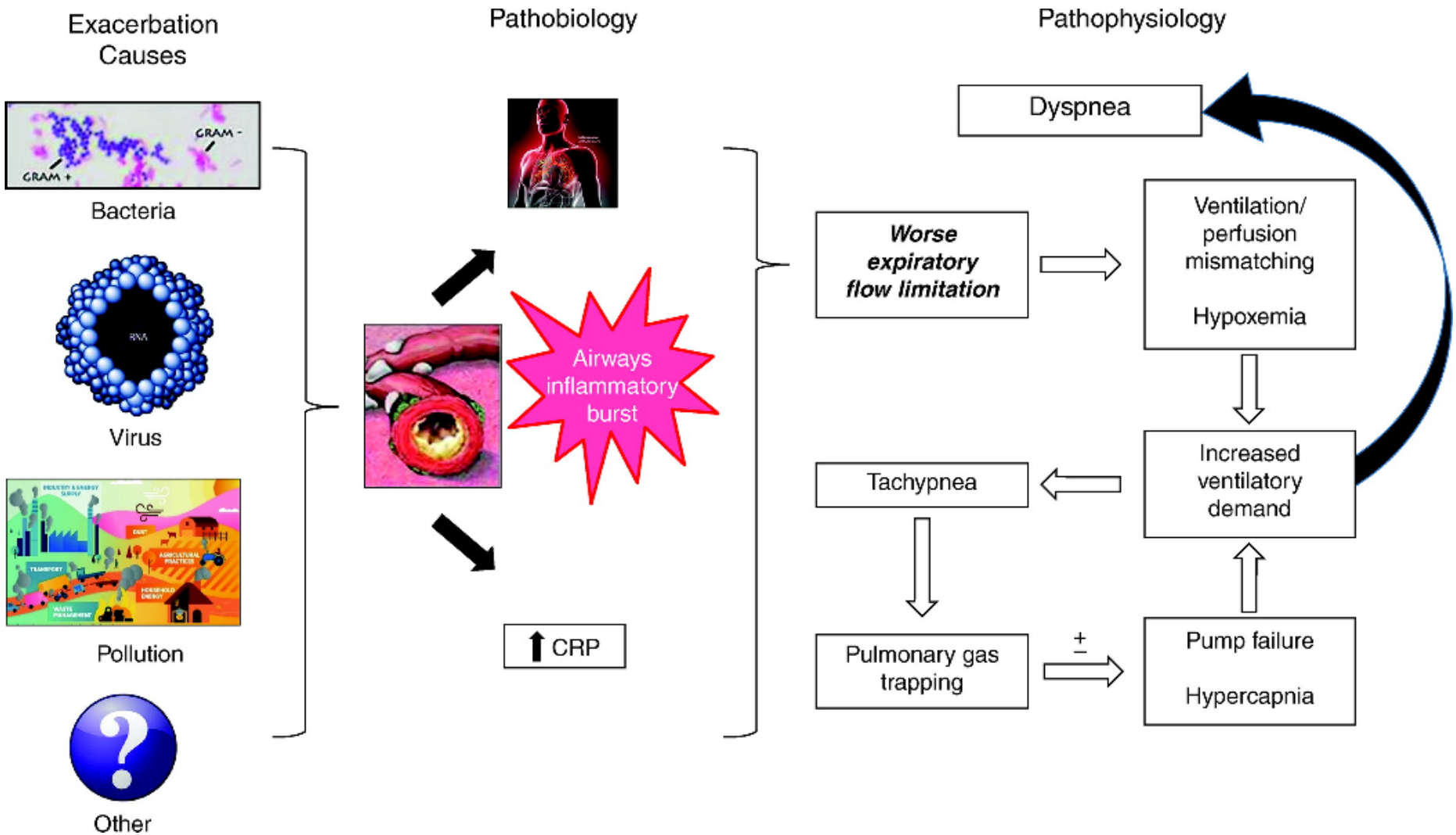
- ECOPD (Exacerbation of Chronic Obstructive Pulmonary Disease)

An event characterized by dyspnea and/or cough and sputum that worsen over ≤ 14 days, which may be accompanied by tachypnea and/or tachycardia and is often associated with increased local and systemic inflammation caused by airway infection, pollution, or other insult to the airways.

GOLD 2023

- As symptoms are not specific to COPD relevant differential diagnoses should be considered.

Causes, Pathobiological mechanisms, and Pathophysiological consequences in an ECOPD



Confounders or contributors to be considered in Patients Presenting with suspected COPD Exacerbation

Most Frequent

Pneumonia

- Chest radiograph

Pulmonary embolism

- Clinical probability assessment (hemoptysis, surgery, fracture, history of cancer, DVT)
- D-dimer
- CT angiography for pulmonary embolism

Heart failure

- Chest radiograph
- NT pro-Brain Natriuretic Peptide (Pro-BNP) and BNP
- Echocardiography

Less Frequent

Pneumothorax, pleural effusion

- Chest radiograph
- Thoracic ultrasound

Myocardial infraction and/or cardiac arrhythmias (atrial fibrillation/flutter)

- Electrocardiography
- Troponin

Diagnosis and Assessment

1. Complete a through clinical assessment for evidence of COPD and potential respiratory and non-respiratory concomitant disease, including consideration of alternative cause for patient's symptoms and signs: Primarily pneumonia, heart failure, and pulmonary embolism.

2. Assess:
   a. Symptoms, severity of dyspnea that can be determined by using a VAS, and documentation of the presence of cough.
   b. Signs (tachypnea, tachycardia), sputum volume and color, and respiratory distress (accessory muscle use).

3. Evaluate severity by using appropriate additional investigations such as pulse

4. Oximetry, laboratory assessment, CRP, arterial blood gases.

Establish the cause of the event of possible (Viral, bacterial, environmental, other).

Urgent medical contact: Patient with suspected ECOPD

Confirm ECOPD diagnosis and determine severity

Severity	Criteria for judging severity
Mild (default)	• Dyspnea VAS <5 • RR <24 breaths/min • HR <95 bpm • Resting Sa_{O_2} ≥92% breathing ambient air (or patient's usual oxygen prescription) AND change ≤3% (when known) • CRP <10 mg/L (if obtained)
Moderate (meets at least three of five*)	• Dyspnea VAS ≥5 • RR ≥24 breaths/min • HR ≥95 bpm • Resting Sa_{O_2} <92% breathing ambient air (or patient's usual oxygen precription), AND/OR change >3% (when known) • CRP ≥10 mg/L If obtained, ABG may show hypoxemia (Pa_{O_2} ≤60 mmHg) and/or hypercapnia (Pa_{CO_2} >45 mmHg) but no acidosis (pH >7.35)
Severe	• ABG show hypercapnia and acidosis (Pa_{CO_2} >45 mmHg and pH <7.35)

Consider differential diagnosis

- Heart failure
- Pneumonia
- Pulmonary embolism

Appropriate testing and treatment

Determine etiology

Potential Indications for Hospitalization Assessment*

- Severe symptoms such as sudden worsening of resting dyspnea, high respiratory rate, decreased oxygen saturation, confusion, drowsiness.
- Acute respiratory failure
- Onset of new physical signs (e.g., cyanosis, peripheral edema)
- Failure of an exacerbation to respond to initial medical management
- Presence of serious comorbidities (e.g., heart failure, newly occurring arrhythmias, etc.)
- Insufficient home support

* Local resources need to be considered

Goals of treatment

To minimize negative impact of current exacerbation and prevent another occurrence.

Management of Severe but not Life-threatening

Assess severity of symptoms, blood gases, chest radiograph

Administer supplemental oxygen therapy, obtain serial arterial blood gas, venous blood gas and pulse oximetry measurements

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 spacer or air-driven nebulizers when appropriate

Consider oral corticosteroids

Consider antibiotics (oral) when signs of bacterial infection are present

Consider noninvaslve mechanical ventilation (NIV)

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

Monitoring

Target - 88-92% SPO2

100% oxygen saturation may be dangerous

Blood gases, if available, to monitor for PaCo2 retention and/or worsening acidosis.

Pulse oximetry is not as accurate as arterial blood gas measurement

Venturi masks - Offer more accurate and controlled delivery of inspired oxygen than

Nasal prongs

Indications for NIV

- Respiratory acidosis PaCO2>45 mmHg and arterial PH<7.35
- Severe dyspnea
  - Use of respiratory accessory muscles,
  - Paradoxical motion of the abdomen, or
  - Retraction of the intercostal spaces
- Persistent hypoxemia despite supplemental oxygen therapy

Indications for mechanical ventilation

- Unable to tolerate NIV or NIV failure
- Status post respiratory or cardiac arrest
- Diminished consciousness, psychomotor agitation inadequately controlled
- Massive aspiration or persistent vomiting
- Persistent inability to remove respiratory secretions
- Severe hemodynamic instability without response to fluids and vasoactive drugs
- Severe ventricular or supraventricular arrhythmias
- Life threatening hypoxemia in patients unable to tolerate NIV

Ahmed SM. Indian J Anaesth 2015

Address Co-Morbidities

- ✔ Cardiovascular diseases
- ✔ Lung cancer
- ✔ Bronchiectasis
- ✔ Sleep apnea
- ✔ Osteoporosis
- ✔ Diabetes and metabolic syndrome
- ✔ Gastroesophageal reflux
- ✔ Anemia
- ✔ Secondary polycythemia
- ✔ Mental health
- ✔ Multimorbidity and frailty

Discharge Criteria and Recommendations for follow-up

1. Full review of all clinical and laboratory data
2. Check maintenance therapy and understanding
3. Reassess inhaler technique
4. Ensure understanding of withdrawal of acute medications (Steroids and/or antibiotics)
5. Assess need for continuing any oxygen therapy
6. Provide management plan for comorbidities and follow-up
7. Ensure follow-up arrangements: early follow-up, and late follow-up < 12 weeks as indicated
8. All clinical or investigational abnormalities have been identified

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: CAT or mMRC

Determine status of commodities

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: CAT or mMRC
- Determine status of comorbidities

Interventions that Reduce the Frequency of COPD Exacerbations

Intervention class	Intervention class
Bronchodilators	LABAs LAMA LABA + LAMA
Corticosteroid-containing regimens	LABA + ICS LABA + LAMA + ICS
Anti-Inflammatory (non-streroid)	Roflumilast
Anti-infectives	Vaccines
Mucoregulators	Long Term Macrolides N-acetylcysteine Carbocysteine Erdosteine
Various others	Smoking Cessation Rehabilitation Lung Volume Reduction Vitamin D Shielding measures (e.g., mask wearing, minimizing social contact, frequent hand washing)

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Summarize

- Exacerbations are part of the natural history of COPD
- Increased risk of mortality
- Prevention is important
- Increased bronchodilator, steroid and antibiotics are fundamental
- Managing comorbidities and oxygen needs also influence survival

- Questions???

CHALLENGES AND SOLUTIONS FOR MANAGING COPD in AFRICA

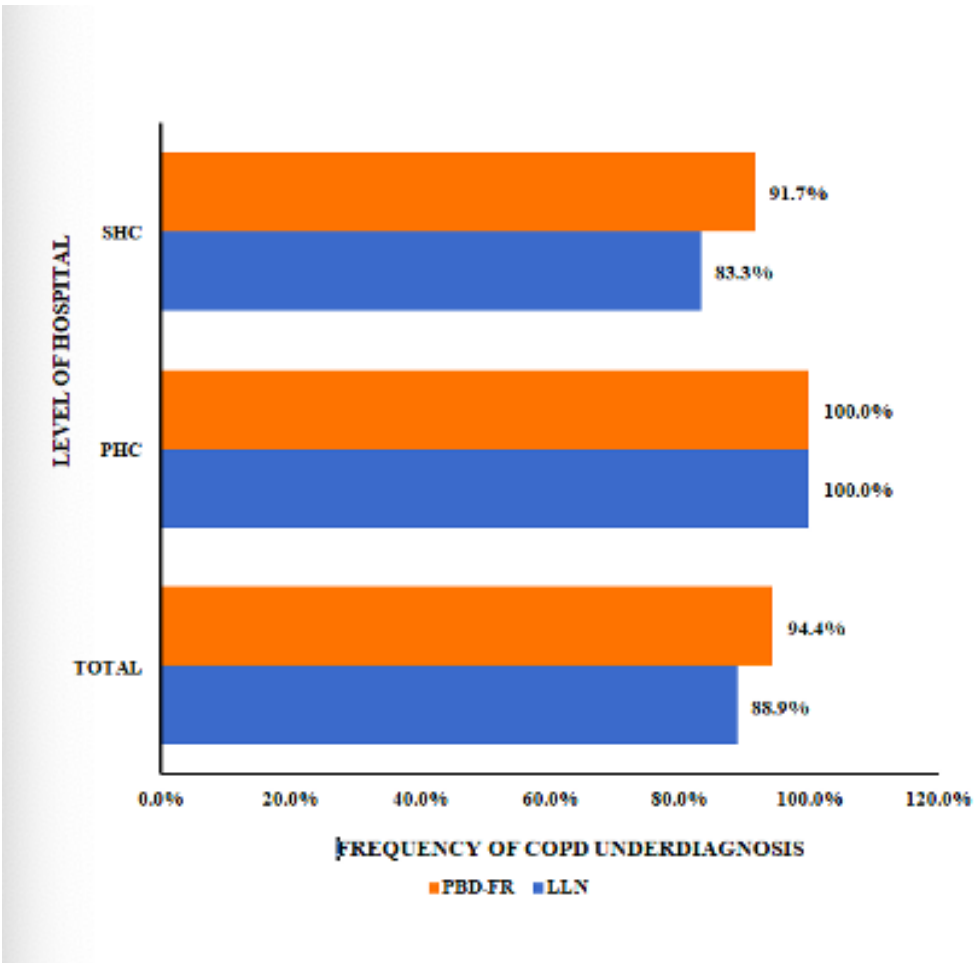
Prof Ozoh

COPD Underdiagnosis in Lagos State

Study done in 3 primary and 3 secondary care facilities (276 participants).

Frequency of COPD was 6.5%

Frequency of COPD underdiagnosis was 94.4%



Ogundare et al (unpublished data)

COPD awareness- public

npj | Primary Care Respiratory Medicine

Back to Top

NPJ Prim Care Respir Med. 2021 Feb 11;31:6. doi: 10.1038/s41533-021-00220-4

COPD awareness in the urban slums and rural areas around Pune city in India

Deesha Deepak Ghorpade [1,2,✉], Anchala Raghupathy [1], Jyoti Deepak Londhe [1], Sapna Jitendra Madas [1], Nisha Vijay Kale [1], Narula Arvinder Pal Singh [3], Reshma Sudhir Patil [3], Monica Sumit Barne [1], Prakash Prabhakar Rao Doke [3], Sundeep Santosh Salvi [1,2]

Feedback

- There were 5420 respondents in the study, only 0.9% were aware of COPD.
- Some of those who have heard of COPD, also did not know the organ affected by the COPD as 6.1% said it is a disease of the heart.

COPD knowledge among doctors

- 23.5% of FPs and 14.3% of GPs have overall good knowledge about COPD

- Less than 50% of GPs and FPs are aware that childhood lower respiratory infections, previous tuberculosis and gender respectively are considered risk factors for COPD.

Ozoh et al. West Afr J Med 2014

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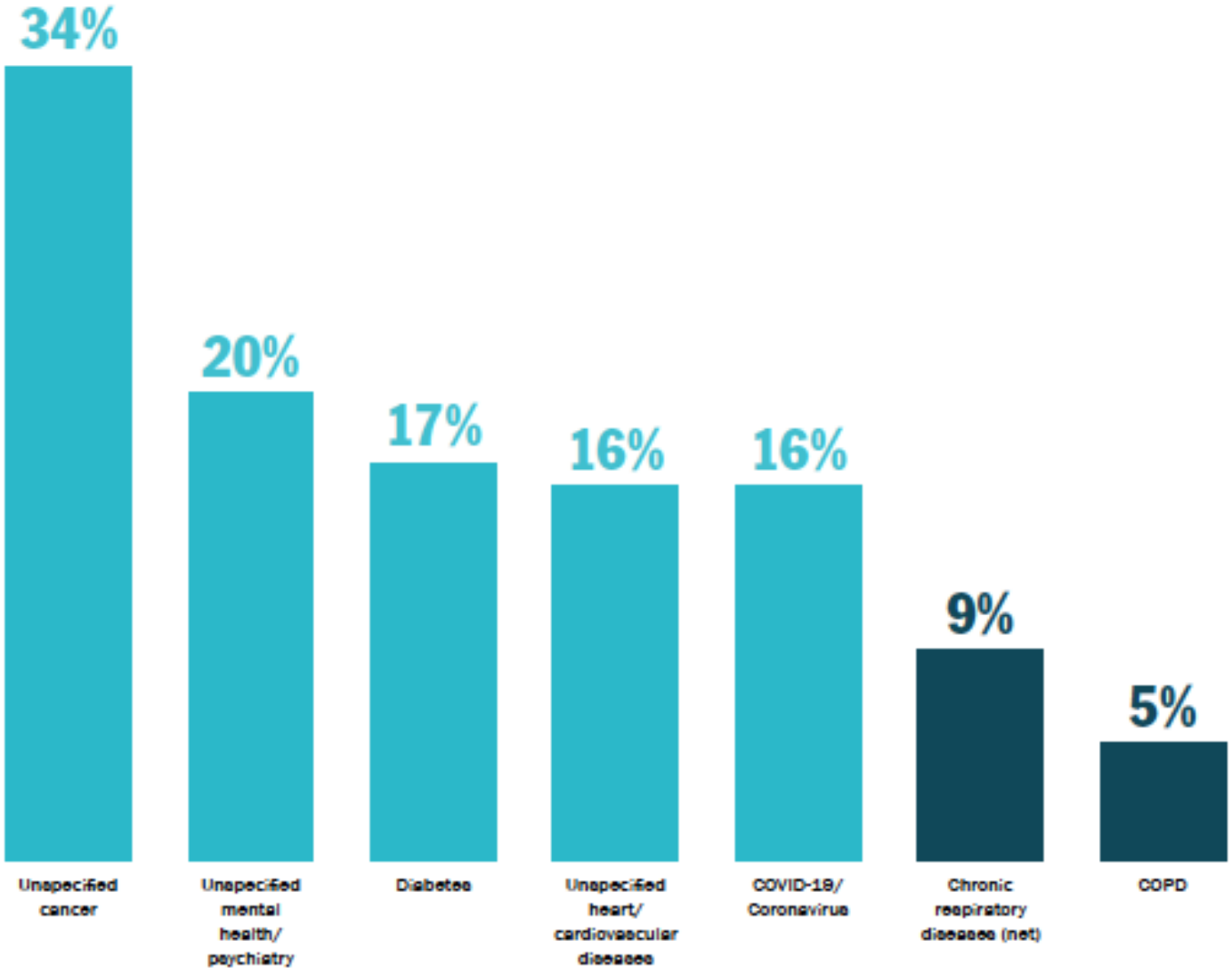
COPD awareness among policy makers

WHICH DISEASES OR ILLNESSES DO HEALTH POLICYMAKERS VIEW AS THE BIGGEST PRIORITIES?



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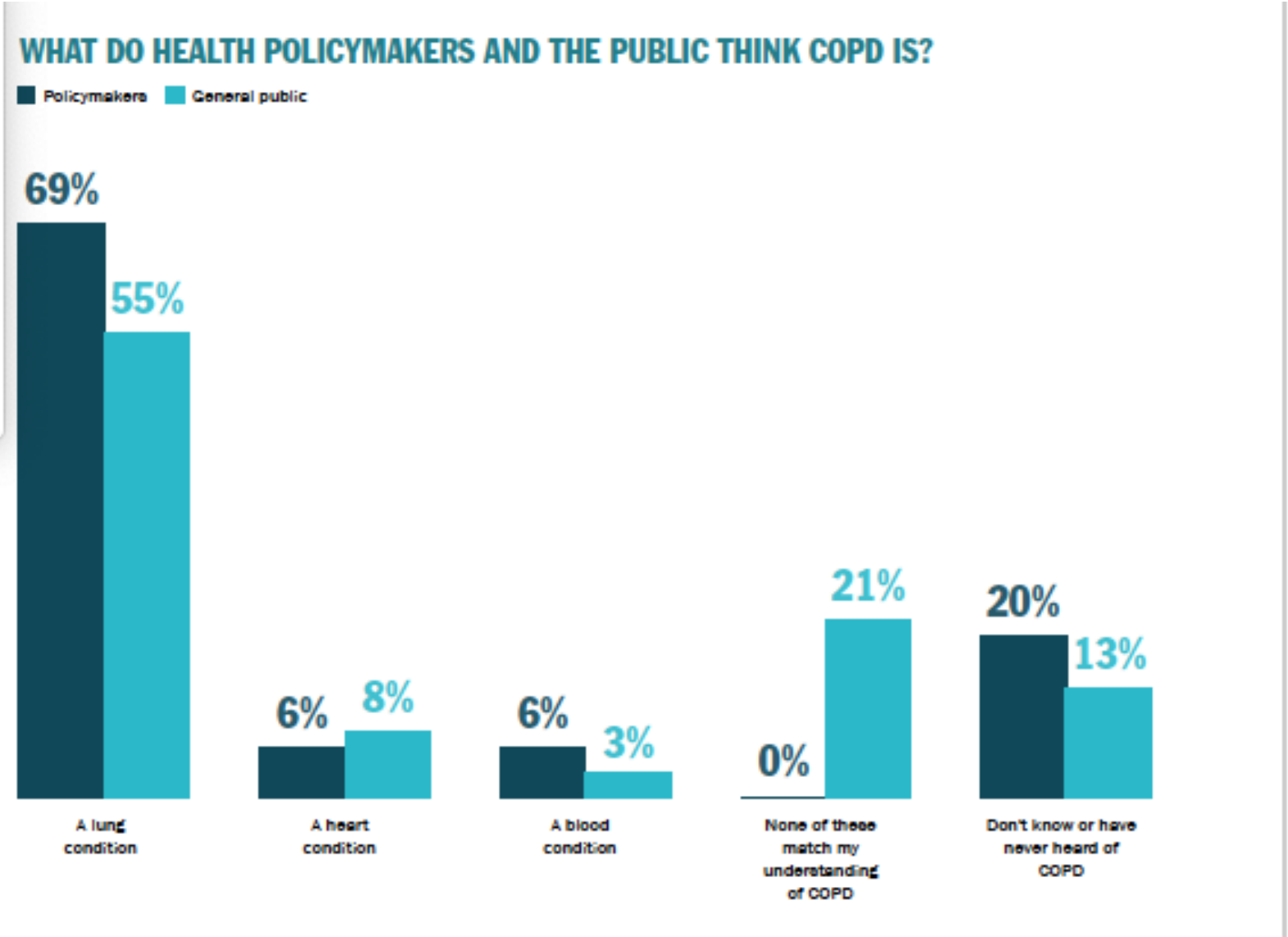
COPD awareness among policy makers



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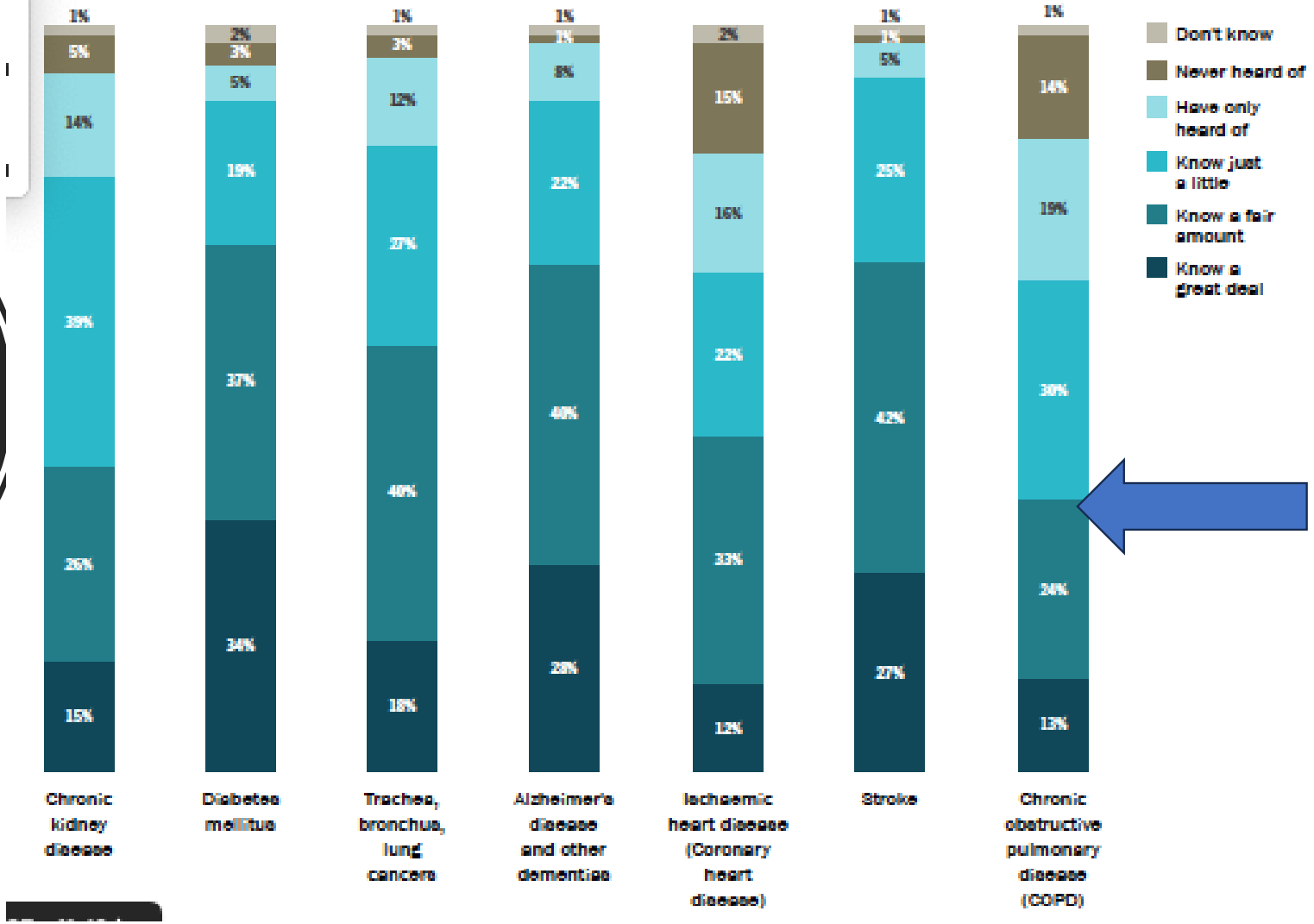
COPD awareness among policy makers

HOW AWARE ARE HEALTH POLICYMAKERS OF DIFFERENT NON-COMMUNICABLE DISEASES?



National Standard Drug Treatment in Africa

Country (EML date)	Budesonide	Budesonide + formoterol	Epinephrine (adrenalin)	Salbutamol	Tiotropium	Named as COPD Rx
Gambia (2019)	Beclomethasone					
Nigeria (2020)		Salmeterol + fluticasone				
Kenya (2019)						
Ghana (2017)						
Uganda (2016)	Beclomethasone					
South Africa (2020)	Beclomethasone	Salmeterol + fluticasone				

Availability of COPD medicines in Africa

Country	Study	SABA	ICS	ICS-LABA	LAMA
Uganda*	Kibirige et al, 2017				NA
Rwanda	Niyonsenga et al, 2021			NA	NA
Tanzania	Egere et al, 2021			NA	NA
Sudan	Egere et al, 2021			NA	NA
DRC	Gupta et al, 2020			NA	NA
Ethiopia	Gupta et al, 2020			NA	NA
Malawi	Johansson et al, 2020 Gupta et al, 2020			NA	NA
Ghana	Nyarko et al, 2016			NA	NA
Benin	Mendis et al, 2012			NA	NA
Nigeria*	Ozoh et al, 2021				
Gambia	Sanyang et al, 2021				

Affordability

Country	Study	SABA	ICS	ICS-LABA	LAMA
Morroco	Ghanname et al, 2013				NA
Sudan	Thomson et al, 2021				NA
Uganda	Kibirige et al, 2017				NA
Nigeria	Ozoh et al, 2021				
Gambia	Sanyang et al, 2021				

Acceptability

- Aversion to inhaled medicines
- Myths and culture
- An extra layer for consideration

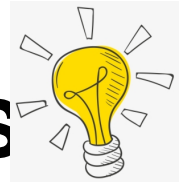
Thomson et al, 2021, Simba et al,2018

Solutions: Awareness and prescriptions

- Increased provider awareness
- Improve population literacy
- Incentivized training to upskill health care providers
- Prescription pattern drives availability and co

Ozoh et al. American J Resp Critic Care Medicine 2023

Solutions: Guidance & Disease Registries



- Update National Standard Drug Treatment Guidelines/ EMLs
  - Treatment of COPD with LAMA combination inhalers, alongside smoking cessation, and influenza/pneumococcal vaccination.

- Monitoring disease rates
  - Prevalence
  - Registries enabling data capture of COPD patients
  - Education

Ozoh et al. American J Resp Critic Care Medicine 2023

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Summarize

- The challenges of COPD management in Africa can be overcome
- Stakeholders need to come together
- Evidence of burden
- Improve knowledge
- Access to diagnostics and treatment

- Questions???

Practice change: Screening patients with COPD using the CAPTURE Tool

COPD Assessment in Primary Care to Identify Undiagnosed Respiratory Disease and Exacerbation Risk

Capture tool and peak flow

- Underdiagnosis of COPD is a global health problem that appears more profound in LMIC where it is linked to high rates of mortality.
- Earlier detection of primary care patients with previously undiagnosed, yet clinically significant COPD, may improve short- and long-term patient outcomes and may be cost-effective.
- A five-item questionnaire which is used to assess exposure, breathing problems, tiring easily, and acute respiratory illness.
- CAPTURE with peak flow measurement can help identify patients with COPD who will benefit from currently available therapy and require futher diagnostic testing.

Martinez FJ et al. Am J Respir Crit Care Med 2017

Yawn BP eat al. Chronic Obstr Pulm Dis 2021

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RAISING COPD AWARENESS IN AFRICA

Figure 1b. CAPTURE Tool With Scoring and Clinical Action Recommendations

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 *(0 points)*	Yes *(1 point)*	
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 the seasons, weather, or air quality?	☐	☐	
3. Does your breathing make it difficult to do such things as carry heavy loads, shovel dirt or snow, jog, play tennis, or swim?	☐	☐	
4. Compared to others your age, do you tire easily?	☐	☐	
5. In the past 12 months, how many times did you miss work, school, or other activities due to a cold, bronchitis, or pneumonia?	**None** *(0 points)* ☐	**Once** *(1 point)* ☐	**2 or more** *(2 points)* ☐

Total Score (0-6): _____

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RAISING COPD AWARENESS IN AFRICA

Total Score (check ONLY one box based on above score)		**RECOMMENDED ACTION:**
0 or 1 ☐		A. Low likelihood of COPD based on CAPTURE: No further testing recommended at this time
2, 3, or 4 Record Highest Peak Flow (highest of 3): _____ L/min	(check one based on highest Peak Flow) Females ≥ 250 L/min Males ≥ 350 L/min ☐ Females < 250 L/min Males < 350 L/min ☐	B. Consider rescreening or reassessing in 12 months C. Evaluation including spirometry recommended
5 or 6 ☐		D. Significant likelihood of COPD: Evaluation including spirometry recommended

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Peak Flow measurement

A peak flow meter is a simple, easy-to-use device that measures how fast you can exhale after maximaal inhalation.

It measures flow in Litres/min.

A normal peak flow in adult may be between 400-700L/min

Peak flow measurement procedure

1. Sit or stand up straight
2. Make sure the maker is at the bottom of the meter
3. Take a deep breath, filling your lungs completely, and hold it.
4. Put your mouth around the mouthpiece and close your lips tightly
5. Blow all the air out of your lungs as hard and as fast as possible in a single breath
6. Write down the number by the marker on the meter

Repeat these steps 3 times and take the highest of the readings.

What we need to do

- Screen patients with chronic respiratory symptoms (key indicators for COPD) using the CATURE tool.
- Obtain basic demographic data
- Refer those who require spirometry to LUTH (free of charge and linked to care)
- Call these number to inform of a referred patient (Code numbers)
- Give patient the number
- Complete consent
- We will cover transport
- We will collect the completed CATURE booklet after 6 months.
- Stay in touch!

- Questions???