Government of West Bengal
State NCD Cell
Health & Family Welfare Department
National Health Mission
GN-29, 4th Floor, Swasthya Sathi Building, Swasthya Bhawan Premises, Sector - V
Salt-Lake, Bidhannagar, Kolkata – 700091

Memo no. HFW-27024/7/2020-SPSRC Sec. Dept. of HFW/176/2020 **Dt.** 10.8.2020

To,
The Chief Medical Officer of Health
All Districts & Health Districts

Madam/ Sir,

In pursuance of department earlier administrative order of Asthma & COPD clinic (memo no. HFW/NCD/166/2020 dt. 03.08.2020), **'A TECHNICAL GUIDELINE WITH SOP'** is now provided as annexure for care & management of COPD in the health facility and hospitals.
You are hereby requested for wide dissemination of the guideline to all available physicians, chest specialists, paediatrician and medical officers under your control.

This has approval of the competent authority.

10/8/2020
State Programme Officer, NCD-II
Govt. of West Bengal

Memo No. HFW-27024/7/2020-SPSRC Sec Dept of HFW/176/2020 **Dated:-** 10.8.2020.
Copy forwarded for information & necessary action please:-

1. The Mission Director, NHM
2. The Director of Health Services
3. The Director of Medical Education
4. The Addl. Mission Director, (NHM)
5. The Jt. DHS, NCD
6. – 33. The Chief Medical Officers of Health, All districts & health districts - **with a request to nominate (name, designation with contact no.) one physician, one paediatrician, two staff nurse, psychologist of NTCP and counsellor of NCD clinic from the designated hospitals of District COPD clinic for future training.**
34. Dy. CMOH-II & DNO, All districts & health districts
35. District Epidemiologist, NPCDCS, All districts & health districts
36. Coordinator, I.T cell for web posting in departmental portal
37. Office copy

10/8/2020
State Programme Officer, NCD-II
Govt. of West Bengal

Govt. of West Bengal

Technical Guideline and Standard Operating Procedure (S.O.P.) for Care and management C.O.P.D. under N.P.C.D.C.S. programme

State NCD Cell

Department of Health & Family Welfare

Acknowledgement:

1. *GOLD Guidelines for COPD 2020*
2. *Indian COPD guidelines*
3. *Dr. Saumitra Mohan, IAS, Mission Director, NHM, Govt. of West Bengal*
4. *Dr. Debasis Bhattachrya, Director of Medical Education, Govt. of West Bengal5.*

Dr. Ajay Kr. Chakrabarty, Director of Health Services, Govt. of West Bengal

6. *State NCD cell, Dept. of Health & FW, Govt. of West Bengal*
7. *Members of State Expert Committee on COPD:*
    a. *Dr. Subhasis Mukherjee, Associate Prof. Dept. of Chest Medicine,COM, Sagar Dutta Hospital, Kamarhati*
    b. Prof. (Dr.) Sushmita Kundu, HOD, Dept. Of Respiratory Medicine, R.G.Kar MCH
    c. Prof. (Dr.) Supriya Sarkar, HOD, Dept. of Chest Medicine, COM, Sagar Dutta Hospital, Kamarhati
    d. Dr. Jaydip Deb, Prof. Chest Medicine, NRS MCH.

Background:

Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease caused by damage and destruction of the normal lung structure by noxious gases and particulates inhaled from tobacco smoke, biomass smoke,etc. It is the 2nd leading cause of death amongst Non-Communicable Diseases (NCDs) across the country. Among all states, West Bengal ranks 6th in the country in percentage of total deaths due to all NCDs, 3rd highest for COPD prevalence, and 5th highest for COPD mortality. According to the GBD data, West Bengal had about 43.4 lakh people suffering from COPD and about 50,000 people died due to this disease and COPD accounted for approx. 20% of all deaths in West Bengal in 40+ age group. In West Bengal alone, the estimated economic burden due to productivity lost crossed ₹15,400 crores in the previous year. But, in reality, COPD is a very much preventable and treatable disease, so with proper diagnosis and treatment there should be significant improvement in the morbidity, mortality as well as economic burden for COPD

Objective:

- Health promotion through behavior change with involvement of community, civil society, community based organizations, media etc.
- Early diagnosis & treatment at all levels in the health care delivery system - initially in secondary level hospital with essential equipment & drugs as District COPD clinic.
- Build capacity at various levels of health care for prevention, early diagnosis, treatment, IEC/BCC, operational research and rehabilitation.
- Provide support for diagnosis and cost effective treatment at primary, secondary and tertiary levels of health care.
- Provide support for development of database through a robust Surveillance System and to monitor morbidity, mortality and risk factors.

Components:

1. To publish and implement a uniform and standard diagnostic along with care and management protocol for proper management of COPD patients across the state in primary and secondary level health care facilities.
2. To strengthen the early diagnosis of COPD in primary and secondary care hospitals.
3. To establish a dedicated " C.O.P.D. and Asthma OPD Clinic " at DH/SSH/SDH @one/ district.
4. To improve the care and management for both stable COPD and COPD with acute exacerbation including proper and timely referral.
5. To arrange for necessary capacity building for all HR: Specialists (Physician & Paediatrician),Medical officers, staff nurses, CHO, SC staff & identified HR who will operate the Spirometer .
6. IEC:
    a. For making the OPD clinics visible with necessary signage & wide publicity.
    b. Sensitization of ASHA .
    c. Community awareness.

COPD (Chronic obstructive pulmonary disease):

COPD is a common, preventable lung disorder characterized by progressive, poorly reversible airflow limitation often with systemic manifestations, in response to tobacco smoke and/or other harmful inhalational exposures

Risk factors:

1. Tobacco smoking is the most well-established risk factor for COPD.
2. Both smokeless and smoking forms of tobacco are associated with serious health hazards. Smoking tobacco is primarily responsible for COPD.
3. Bidi and other indigenous forms of tobacco smoking are at least as (or even more) harmful than cigarette smoking.
4. Low tar or filtered /e-cigarettes are not “less harmful”.
5. There is no minimum number of cigarettes/bidi per day below which the risk for COPD decreases. However Risk increases with increasing duration of smoking.
6. Exposure to Environmental Tobacco smoking (ETS)/ passive smoking especially in closed environment is also a definite risk factor for COPD.
7. Exposure to biomass fuel smoke is a strong risk factor for COPD especially in women in rural areas.
8. There are limited data on the association of ambient air pollution and COPD, and its causative role in COPD needs further evaluation.
9. There are some evidences to attribute an etiological role of post-tubercular fibrosis in causing COPD.
10. A subgroup of chronic asthma may clinically behave like COPD; however it remains to be established whether it is a true case of COPD.
11. Alpha 1 antitrypsin deficiency is a genetic factor responsible for COPD- to be specially looked for in young, non-smoker COPD patients with panacinar emphysema.

Clinical features:

COPD should be considered in persons with risk factors specially smoking with chronic symptoms of cough, sputum production, shortness of breath, and/or wheezing. COPD patients may present to a healthcare facility in four typical ways:

a) With one or more of the characteristic respiratory symptoms of chronic progressive breathlessness, cough, sputum production, wheezing, and/or chest tightness.
b) Sometimes patients may present without typical symptoms like breathlessness, because patients might have reduced their physical activity unknowingly to very low levels and might just complain of fatigue.
c) With symptoms attributed to complications of the disease like weight loss (COPD related cachexia) or leg swelling (due to cor-pulmonale).
d) With an exacerbation.

Clinical signs of COPD:

Following are the signs that may be present on physical examination in a COPD patient.

Inspection:

- ✓ Pursed-lip breathing
- ✓ Increased anteroposterior diameter of the chest (barrel-shaped chest)
- ✓ Following additional signs may be present during exacerbations or COPD with complications like cor-pulmonale:-
- ✓ Use of accessory muscles of respiration
- ✓ Jugular venous distension during expiration
- ✓ Intercostal suction
- ✓ Pulsus paradoxus
- ✓ Peripheral edema
- ✓ Muscle wasting

Palpation:

- ✓ Restricted chest expansion

Percussion:

- ✓ Chest hyperresonance percussion note bilaterally
- ✓ Obliteration of cardiac dullness Lower level of liver dullness

Auscultation:

- ✓ Diminished breath sounds with prolonged expiration (Forced Expiratory time> 6 seconds)
- ✓ Bilateral wheezes may be heard.

Differential diagnosis:

- ➢ Asthma
- ➢ Congestive heart failure
- ➢ Bronchiectasis
- ➢ Pulmonary Tuberculosis

Differentiating COPD from Asthma:

It is very important to differentiate COPD from Asthma as basic pathogenesis, pathophysiology, prognosis and management are different. Spirometry can aid in differentiating the two but clinical history is more important in differentiation between asthma and COPD.

COPD	Asthma
➢ Occurs mainly in smokers ➢ Males are affected more ➢ Onset mostly after 40 years of age ➢ Commonly not associated with allergic rhinitis ➢ Symptoms are persistent and there is no seasonal variation ➢ Family history of allergy or asthma doesn't increase likelihood of COPD diagnosis ➢ Exacerbations, cor-pulmonale, comorbidities are common in COPD ➢ On Chest X-ray, hyperinflation is very common finding ➢ Obstructive airway disease without significant bronchodilator reversibility (increase in FEV1 by <200 ml and less than 12%)	➢ Occurs more in non-smokers ➢ Females are affected more ➢ Onset in childhood or young age ➢ Very commonly associated with history of allergic rhinitis, atopic dermatitis, urticaria ➢ Symptoms are episodic and there is seasonal variation ➢ Family history of allergy or asthma increases likelihood of asthma diagnosis ➢ Exacerbations, cor-pulmonale, comorbidities are common in COPD ➢ Chest X-ray is often normal, hyperinflation is a late phenomenon and carries poor prognosis ➢ Obstructive airway disease with significant bronchodilator reversibility (increase in FEV1 by >200 ml and more than 12%)

Diagnosis of COPD:

COPD is diagnosed with the help of the followings:

- ➢ Presence of risk factors
- ➢ Clinical features suggestive of COPD
- ➢ Spirometry with reversibility test-
    - Post bronchodilator FEV1/FVC ratio less than 0.7 or 70

- Without significant reversibility after bronchodilators (increase in FEV1 by <200 ml and less than 12% compared to pre-bronchodilator FEV1)

Indication for spirometry

- Spirometry should be conducted in all patients suspected of having COPD.
- It is essential to exclude pulmonary tuberculosis before advising for spirometry. So, it is essential to have a negative sputum for AFB report before performing spirometry.
- In the absence of availability of spirometry, patients suspected of having COPD should be referred for a spirometric evaluation to a center with the facility.
- A post-bronchodilator FEV1/FVC below the LLN (lower fifth percentile of values from a reference population) should be used as the criterion for diagnosis of airflow obstruction.
- In the absence of reference equations for LLN, FEV1/FVC < 0.7 may be used as the cutoff for defining airflow obstruction.
- Absence of bronchodilator reversibility does not differentiate COPD from asthma, and its presence does not predict the response to treatment. However, all FEV1 values should be reported post-bronchodilator.
- Spirometry is not recommended as a screening tool in asymptomatic individuals to detect airflow obstruction
- PEF (Peak Expiratory Flow) should not be routinely used for screening, diagnosis or monitoring in COPD
- Spirometry should be done for diagnosis and also for monitoring response to treatment.

Assessment of COPD symptoms:It is done by mMRC (modified Medical Research Council) scale or CAT (COPD assessment test) score

A. mMRC scale:

mMRC Grade 0.	I only get breathless with strenuous exercise.
mMRC Grade 1.	I get short of breath when hurrying on the level or walking up a slight hill.
mMRC Grade 2.	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.
mMRC Grade 3.	I stop for breath after walking about 100 meters or after a few minutes on the level.
mMRC Grade 4.	I am too breathless to leave the house or I am breathless when dressing or undressing.

[a] Fletcher CM. BMJ 1960; 2: 1662.

B. CAT Score:

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: ( )

Assessment of COPD severity:

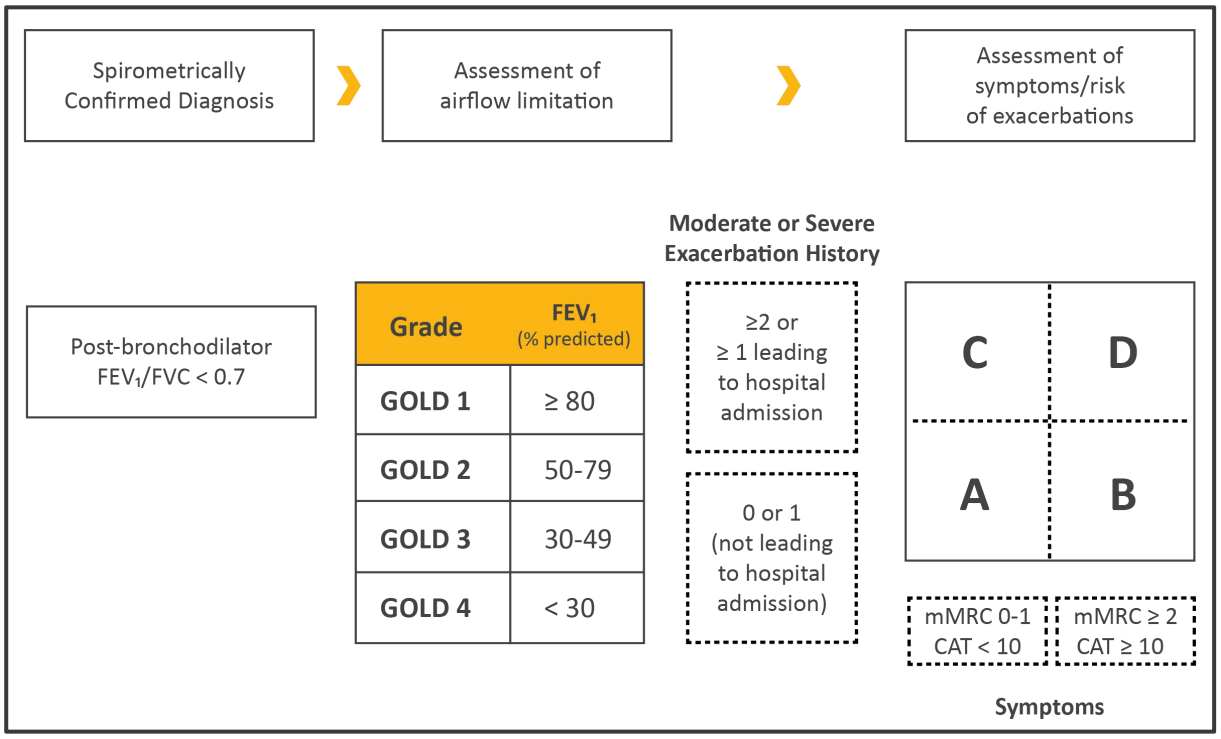
A. GOLD staging based on post bronchodilator FEV1

In patients with FEV1/FVC < 0.70:

GOLD 1:	Mild	$FEV_1 \geq 80\%$ predicted
GOLD 2:	Moderate	$50\% \leq FEV_1 < 80\%$ predicted
GOLD 3:	Severe	$30\% \leq FEV_1 < 50\%$ predicted
GOLD 4:	Very Severe	$FEV_1 < 30\%$ predicted

TABLE 2.4

B. Revised ABCD assessment based on symptoms and frequency of exacerbations:



Investigations:

- Sputum smear examination: All new COPD suspects with cough of more than 2 weeks' duration should undergo sputum smear examination for acid fast bacilli to rule out pulmonary tuberculosis as per the standard practice of RNTCP.
- Pulse oximetry should be used to screen for hypoxemia in stable disease with FEV1 < 50% and in the presence of clinical suspicion of hypoxemia.
- Chest X-ray: Diagnosis of COPD should not be made on the basis of a chest radiograph. Chest radiograph may be done during the initial evaluation of COPD to look for comorbidities, complications, and alternative diagnoses
- Spirometry with reversibility
- 6MWT may be used for monitoring of exercise capacity in COPD
- An arterial blood gas analysis should be performed if arterial saturation by pulse oximetry is less than 90%.
- ECG, Echocardiography (where available)to rule out cardiac comorbidity.

Management of Stable COPD:

A. Non-Pharmacological management:

- **Smoking cessation:** All patients of COPD should receive counselling about smoking cessation at every visit.
- Vaccination:
  - All COPD patients should receive Influenza vaccine annually preferably in the months October-November

- COPD patients < 65 yrs of age and FEV1<40% predicted and those with co morbidities like ischaemic heart disease, diabetes, CKD should receive 23 valent pneumococcal vaccine (PCV 23) , a second dose should be repeated after 5 years or after 65 years of age whichever is earlier.
- COPD patients > 65 yrs of age who have never received pneumococcal vaccine should receive one 13 valent pneumococcal conjugate vaccine (PCV 13)

It should be followed by a dose of 23 valent pneumococcal vaccine (PPSV 23) after 1 year.

- Pulmonary rehabilitation: pulmonary rehabilitation should be encouraged in all COPD patients.

B. Pharmacological management:

COPD group wise recommendation of inhalational pharmacotherapy:

- GOLD Group A (low symptoms, low exacerbation)-
  - Tiotropium MDI 2 puffs once daily with valved spacer- preferred 1st choice
  - Salbutamol/Levosalbutamol+Ipratropium bromide MDI 2 puffs 4times daily with valved spacer- alternative
- GOLD Group B (more symptoms, less exacerbation)-
  - **LAMA monotherapy**-Tiotropium MDI 2 puffs once daily with valved spacer- preferred 1st choice
  - **Dual Bronchodilator (LABA+LAMA)-**Tiotropium + Formoterol MDI 2 puffs once daily with valved spacer- alternative if symptom is not controlled with Tiotropium alone
- GOLD group C (Less symptom, more exacerbation)-
  - **Dual Bronchodilator (LABA+LAMA)**- Tiotropium + Formoterol MDI 2 puffs once daily with valved spacer- Preferred 1st choice.
  - **Tripple therapy**-Tiotropium MDI 2 puffs once daily with valved spacer + Formoterol + Budesonide (6/200 mcg per puff) -alternative therapy if symptoms are not controlled and if FEV1<50% or absolute blood eosinophil count >300 .
  - Additional therapy-

  Phosphodiesterase 4 inhibitor- Tab. Roflumilast 400 mcg, 1 tablet once daily at night if FEV1 <50% or history of repeated exacerbations.

  Or

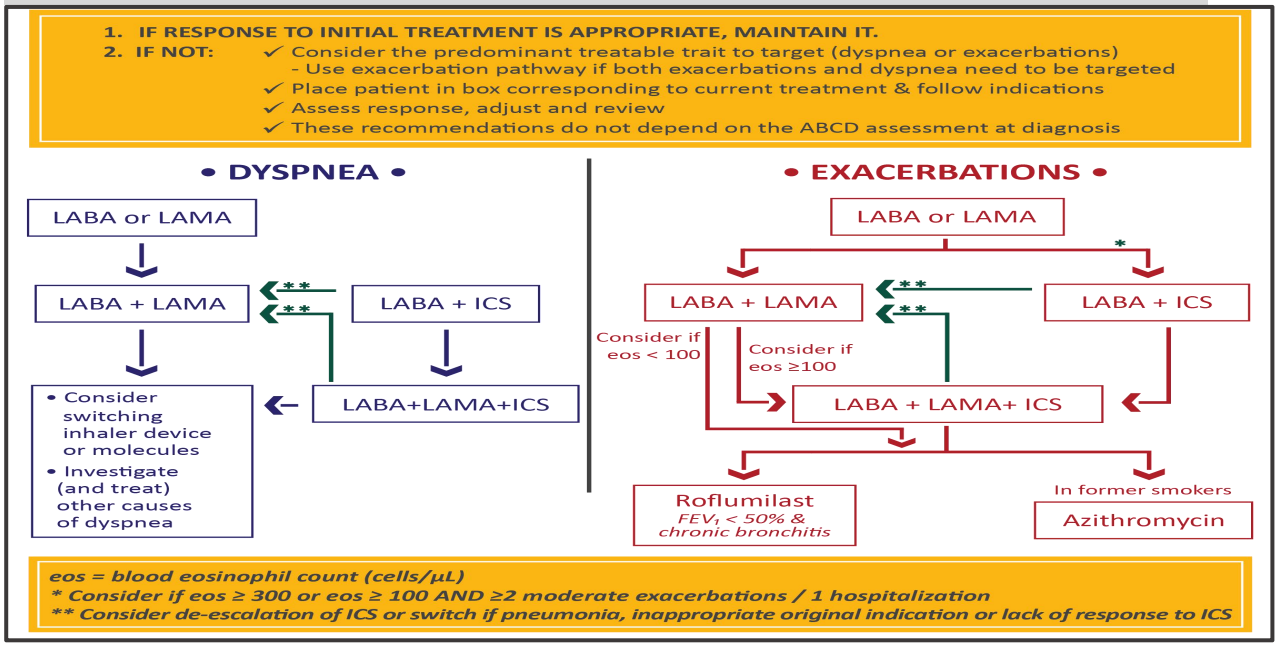
  Sustained released Theophyllines 400 mg once daily at night
- GOLD group D (more symptoms, more exacerbations)-
  - **Tripple therapy**-Tiotropium MDI 2 puffs once daily with valved spacer + Formoterol + Budesonide (6/200 mcg per puff) - Preferred 1st choice specially if FEV1<50% or absolute blood eosinophil count >300 .
  - **Dual Bronchodilator (LABA+LAMA)**- Tiotropium + Formoterol MDI 2 puffs once daily with valved spacer- alternative therapy
  - Additional therapy-

  Phosphodiesterase 4 inhibitor- Tab. Roflumilast 400 mcg, 1 tablet once daily at night if FEV1 <50% or history of repeated exacerbations.

  Or

  Sustained released Theophyllines 400 mg once daily at night

Follow up pharmacotherapy in COPD:



Some important information regarding pharmacotherapy:

- Long-acting antimuscarinic agents (LAMA) are useful in stable COPD (FEV1 < 80%) to control symptoms and decrease the risk of exacerbations.
- LAMA is superior to LABA monotherapy
- LAMA is superior to SAMA or SABA
- SABA and SAMA are equally effective when used for COPD but inferior to LAMA and should be used for short time rescue therapy
- ICS monotherapy should not be used
- ICS have a beneficial effect in subgroup of COPD patients with FEV1 < 50% . subgroup of COPD patients with frequent exacerbations (≥2 exacerbations/ year). And patients with absolute eosinophil count >300
- LAMA plus LABA may be used in patients who continue to have symptoms on monotherapy, except for those with frequent exacerbations.
- LABA plus ICS should be preferred over LABA alone in patients with FEV1 < 50% or those having frequent exacerbations.
- In patients of severe COPD (FEV1 < 50%), triple therapy may be used in those who are symptomatic despite single or dual bronchodilator therapy
- Oral methylxanthines can be used as add-on therapy in patients continuing to have symptoms despite optimum inhaled therapy.
- Patients on oral methylxanthines need to be monitored for side effects or drug interactions.
- Roflumilast (PDE 4 inhibitors) may be used in frequent exacerbators as an add-on or substitute to ICS.
- Routine use of mucolytic agents is not recommended in patients with COPD
- No role of cough suppressants in management of COPD.

Correct technique of using pMDI with Spacer:

- Sit up straight, and assemble spacer device
- Remove inhaler cap and hold inhaler upright by placing index finger on top of the canister while providing support on the bottom of the device with the thumb, and shake well
- Insert inhaler upright into spacer
- Put mouthpiece between teeth without biting and close lips to form good seal, keeping the tongue relaxed and not blocking the mouthpiece
- Take a few deep breaths and breathe out gently away from the device
- Hold spacer horizontally at level of mouth, and press down firmly on canister with the index finger, once only, to release one puff of medicine
- Breathe in slowly, evenly and deeply, till the lungs seem completely filled, and then hold breath for about 10 s or as long as comfortable OR Breathe in and out normally for four breaths
- Remove spacer from mouth Breathe out gently away from the device, and then inhale normally
- Remove inhaler from spacer
- If an extra dose is needed, wait 30 s to a minute, and then repeat steps three to 11 Replace inhaler cap and disassemble spacer device
- Always ask the patient to rinse and gurgle his/her mouth with water after taking inhaled corticosteroids (ICS).

Management of COPD exacerbation:

Acute exacerbation(AE) of COPD is a sudden change of symptoms (baseline dyspnea, cough, and/or sputum production) that is beyond normal day-to-day variation. Diagnosis of AE COPD is clinical.

Classification of COPD exacerbations:

- **Mild:** exacerbations requiring Short acting bronchodilator nebulization/MDI with spacer therapy alone
- **Moderate:** exacerbations requiring Short acting bronchodilator nebulization/MDI with spacer therapy with antibiotic and/or oral corticosteroids.
- **Severe:** exacerbations hospital admission or presenting with respiratory failure requiring non-invasive or invasive mechanical ventilatory support

Assessment of AE COPD:

- Clinical assessment
- Pulse oximetry.
- Chest radiographs are worthwhile in excluding an alternative diagnosis like pneumonia, pneumothorax, pleural effusion, and others.
- An electrocardiogram facilitates identification of coexisting cardiac abnormalities.
- A complete blood count with urea, creatinine, electrolytes.
- Sputum cultures: Hemophilus influenzae, Streptococcus pneumoniae, and Moraxella catarrhalis are the most common bacterial pathogens involved in an exacerbation. In severe exacerbations requiring invasive ventilation, Pseudomonas aeruginosa is an important consideration. sputum cultures may help in identifying the correct pathogen
- Arterial blood gas (ABG)- should be done where available if Spo2 is <90%

- Spirometry is not recommended during acute exacerbation as patients can't perform the test so result will be errorrenous.

Differential diagnoses or associated complications:

These conditions need to be excluded in assessing AE COPD patients:

- Pneumonia
- Pulmonary embolism
- Pneumothorax
- Pleural effusion
- Pulmonary edema (heart failure)
- Paroxysmal atrial tachycardia (arrhythmias)

Management of COPD exacerbation:

- **Oxygen therapy:**
  - Oxygen should be prescribed to hypoxemic patients with a target SpO2 between 88-92%.
  - Oxygen should be delivered preferably by a Venturi mask, and by nasal cannula upon recovery.
  - Spo2 monitoring is essential in patients receiving oxygen therapy, wherever available.

- **Inhaled Bronchodilators:**
  - Nebulized salbutamol at a dose of 2.5 mg every 20 min (or salbutamol pMDI100 µg 2-4 puffs every 20 min) for 1 h can be given initially. Further dosing will depend on the clinical response, generally every 4-6 h
  - If additional bronchodilatation is desired, a combination of ipratropium (500 µg nebulized or 20 µg 2-4 puffs with pMDI) and salbutamol (2.5 mg nebulized or salbutamol pMDI100 µg 2-4 puffs) every 4-6 h can be used.
  - Nebulizer or pMDIs with spacer are equally effective.
  - Patients should not be nebulized with oxygen but should receive oxygen separately through nasal prongs

- **Systemic corticosteroids:**
  - A short course of oral prednisolone (or equivalent) at a dose of 30-40 mg/day is recommended for managing acute exacerbations.
  - The duration of systemic steroid therapy should be 5-7days, not more than 14 days and no tapering of dose is needed before stopping.
  - Intravenous steroids should be given in patients who are being mechanically ventilated or cannot tolerate oral medication- Inj Hydrocortisone 100 mg i.v. thrice daily should be the initial dose.

- **Antibiotics:**
  - Empirical antibiotic should be started with a broad spectrum antibiotic- Coamoxyclav, Cefpodoxime, cefuroxime, macrolide may be initial antibiotic choice
  - Fluoroquinolones should not be used as empiric therapy because of its antitubercular efficacy

- Combination of antibiotics are not recommended as empirical antibiotic therapy for AE COPD
- Antibiotic therapy may be changed based on sputum culture report
- There is no role of biomarkers like CRP or procalcitonin as a routine test in monitoring AE COPD

Indications for hospitalization in AE COPD:

- 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.

Indications for referral to intensive care unit (ICU) in AE COPD:

- Severe dyspnea that responds inadequately to initial emergency therapy.
- Changes in mental status (confusion, lethargy, coma).
- Persistent or worsening hypoxemia (PaO_2 < 5.3 kPa or 40mmHg) and/or severe/worsening respiratory acidosis (pH < 7.25) despite supplemental oxygen and noninvasive ventilation.
- Need for invasive mechanical ventilation.
- Hemodynamic instability - need for vasopressors.

Deciding on admission in ward or ICU based on BAP 65 score:

- BAP 65- Elevated BUN >24mg/dl, altered sensorium, Pulse rate > 110. Age >65 years.
- If BAP 65 score is 0-1- admission in medical ward
- BAP 65 score 2-4- admission in ICU

Indications for Non-invasive ventilation (BIPAP) in AE COPD:

At least one of the following:

- Respiratory acidosis ($PaCO_2 \geq 6.0$ kPa or 45 mmHg and arterial pH ≤ 7.35).
- Severe dyspnea with clinical signs suggestive of respiratory muscle fatigue, increased work of breathing, or both, such as use of respiratory accessory muscles, paradoxical motion of the abdomen, or retraction of the intercostal spaces.
- Persistent hypoxemia despite supplemental oxygen therapy.

Protocol for BIPAP in AE COPD:

- Full face mask better tolerated in the acute setting
- Start with an inspiratory pressure support (IPAP) of 10 cm H_2O and expiratory pressure support (EPAP)of 4 cm H_2O
- Adjustments Increase IPAP and EPAP by 2 and 1 cm H_2O, respectively

- Titrate to achieve tidal volume (>5 mL/kg), respiratory rate (<35 breaths/min) and normal blood gases.
- Maximum IPAP and EPAP generally used is 18-20 cm H2O and 7-8 cm H2O, respectively.
- Air leaks should be minimized
- Parameters for assessing failure of BIPAP- failure in improvement of clinical parameters and gas exchange at 2-4 hours, development of alteration in sensorium, hemodynamic instability inability to tolerate oro-nasal mask, excessive secretion.

Indications for invasive mechanical ventilation in AE COPD:

- pH ≤7.25
- Unable to tolerate non-invasive ventilation or failure of noninvasive ventilation
- Respiratory or cardiac arrest
- Altered sensorium
- Failure to handle excessive secretions
- Heart rate <50/min with loss of alertness
- Hemodynamic instability without fluid responsiveness
- Severe ventricular arrhythmias
- Life threatening hypoxia

Standard protocol for mechanical ventilation:

- Mode- Volume-assist control mode
- Initial tidal volume- 4-6 mL/kg
- Respiratory rate-14-16/min
- Peak Inspiratory flow rate- 60-70 lit/min
- PEEP 2-3 cm H2O
- Inspiration: Expiration ratio 1:3-1:6
- Flow waveform Square waveform

Criteria for discharge after AE COPD:

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

Dedicated COPD & Asthma Clinic in identified secondary tier hospitals of West Bengal .

Guidelines:

- Secondary care facilities @ 1/District or Health District have been identified and mentioned below to have a dedicated COPD and Asthma OPD clinic to be operational 2 days/week on fixed days (one for Adults & other for pediatrics).
- These special clinics should be manned by:
    - One day OPD by one of the trained Chest specialist/Medicine Specialist.
    - Other day OPD by one of the trained Pediatrician.
- Additional HR:
    - One staff nurse may also be provided by the facility in-charges for these two OPD days.
    - One Psychologist under NTCP /Counsellor of District NCD Clinic will posted to run these clinics.

All these staff will be imparted with two days training at Chest Medicine Department of MCHs to operate the (i) Spirometer & (ii) counselling with patient education regarding smoking cessation and pulmonary rehabilitation, demonstration of proper inhalation technique. They will help to run these clinics including administration of Influenza & Pneumococcal vaccines and record keeping (electronic & physical).

- Every COPD clinic should have digital finger pulse oximeter, sphygmomanometer, Peak Flow meter.
- Accommodation facility for Spirometry may be arranged at OPD premises attached to this OPD to enable the posted HR to manage both (OPD & Spirometry). The same may also be utilized suitable if required by Inpatients on these two days.
- Inhalers (MDI) with Spacers, influenza and pneumococcal vaccines should be available in the COPD clinics.
- Adequate arrangement for nebulization should be made available at suitable place near this clinic for OPD patients with ensuring of the availability of the ingredients.
- There should be at least 12 dedicated beds for COPD & Asthma patients (five male & five female & two Paediatrics within the existing wards) in these identified facilities.
- There should be a ICU facility/ at least HDU service available at all these identified facilities with availability of ABG analyzer, BIPAP and invasive mechanical ventilation.
- Additional equipments supplied from the programme dvn are:

i. Portable Spirometer with non-thermal printing system(Laptop) with printer –One.
ii. Pulse Oximeter-five.
iii. Finger Pulse Oximeter (portable) –ten.
iv. Non Invasive Ventilator-five.

List of identified facilities (Secondary tier Govt. hospitals):

Sl.no.	Name of the District/ Health District	Name of the selected Facility
1	Darjeeling	Darjeeling DH
2	Darjeeling	Siliguri DH
3	Kalingpong	Kalingpong DH
4	Alipurduar	Alipurduar DH

Sl.no.	Name of the District/ Health District	Name of the selected Facility
5	Jalpaiguri	Jalpaiguri DH
6	Coochbehar	Mathabhanga SDH
7	Daksin Dinajpur	Gangarampur SDH
8	Uttar Dinajpur	Islampur SSH
9	Malda	Chanchal SDH
10	Mursidabad	Jangipur SSH
11	Nadia	Krishnanagar DH
12	Hooghly	Immambara DH
13	Diamond Harbour	Kakdwip SDH
14	Purba Medinipur	Tamluk DH
15	Nandigram	Nandigram SSH
16	Bankura	Barjora SSH
17	Purulia	Raghunathpur SDH
18	South 24 Parganas	Vidyasagar SGH
19	Paschim Bardhaman	Asansol DH
20	Bishnupur HD	Bishnupur DH
21	Birbhum	Suri DH
22	Jhargram	Jhargram DH
23	Basirhat HD	Basirhat DH
24	Purba Bardhaman	Kalna SSH
25	Howrah	Howrah DH
26	North 24 Paraganas	Barasat DH
27	Paschim Medinipur	Kharagpore SDH

Abbreviations:

COPD- Chronic Obstructive Pulmonary Disease

GOLD-Global initiative for Obstructive Lung diseases

pMDI-pressurized meter dose inhaler

SABA- Short acting beta agonist

Long acting Beta agonist (LABA)

SAMA- Short acting antimuscarinic agent

LAMA- Long acting anti muscarinic agent

ICS-Inhaled corticosteroid

NIV- Non invasive ventilation

BIPAP- Bilevel positive airway pressure

ABG-Arterial blood gas

Consensus opinion and recommendation of the experts of Respiratory Medicine present in the meeting at Swasthya Bhawan for management of COPD & Asthma:-
(Experts present- Prof. Supriya Sarkar, Prof. Susmita Kundu, Prof. Jaydip Deb, Dr. Subhasis Mukherjee):

Proposed list of Essential Equipments and Drugs to be made available at different tiers of Government Healthcare Facilities in West Bengal for a proper diagnosis and management of COPD:-

Name of Healthcare Facility	Name of Essential Equipments	Name of Essential Drugs	Justification
PHC, BPHC and Rural Hospitals	Nebulizer machine Fingertip Pulse Oximeter Peak Flow Meter	**Inhalational drugs:** Tiotropium MDI Tiotropium+Formoterol (9/6 mcg per puff) Salbutamol+Ipratropium MDI ICS+LABA- Formoterol+Budesonide (6mcg/200mcg) MDI, Salmeterol+Fluticasone(25mcg/250mcg) MDI Spacer with valve **Respules/Respiratory Solutions For Nebulization**: Salbutamol respules Salbutamol+Ipratropium bromide respules Budesonide (0.5mg) respules Formoterol+Budesonide respules **Oral Medications**: Tablet. Prednisolone (20 mg/40mg) Tablet Doxophylline(400mg) Tablet Theophylline Sustained Release(400mg/450mg) Antibiotics-Co-Amoxyclav (625 mg), Cefpodoxime(200mg), Cefuroxime (500 mg), Azithromycin(500mg), **Parenteral drugs**: Inj. Hydrocortisone 100mg Inj Co-amoxyclav (1.2 gm) Inj Piperacillin+Tazobactum (4.5 gm) Inj Levofloxacin 750mg Inj Amikacin 500 mg Inj Enoxaparine 40 mg Inj Enoxaparine 60 mg **Vaccines:** Influenza vaccine 23 valent Pneumococcal vaccine (PPSV 23) 13 valent Pneumococcal vaccine (PCV 13)	Awareness, Training about COPD diagnosis and management and availability of Inhalers and the necessary equipments at the peripheral health facilities will help to improve the care of COPD patients and will also curtail down the number of referrals to higher centres.
Sub-divisional Hospitals	1.Nebulizer machine, 2. Fingertip Pulse Oximeter 3.Peak Flow Meter 4. Spirometer with CPU, Monitor and Printer 5. BIPAP	**Inhalational drugs**: Tiotropium MDI Tiotropium+Formoterol (9/6 mcg per puff) MDI Salbutamol+Ipratropium MDI ICS+LABA- Formoterol+Budesonide (6mcg/200mcg) MDI, Salmeterol+Fluticasone(25mcg/250mcg) MDI Spacer with valve **Respules/Respiratory Solutions For Nebulization**: Salbutamol respules Salbutamol+Ipratropium bromide respules Budesonide (0.5mg) respules Formoterol+Budesonide respules **Oral Medications**: Tablet. Prednisolone (20 mg/40 mg) Tablet Doxophylline(400mg) Tablet Theophylline Sustained Release(400mg/450mg)	

		Antibiotics-Co-Amoxyclav (625 mg), Cefpodoxime(200mg), Cefuroxime (500 mg), Azithromycin(500mg), **Parenteral drugs:** Inj. Hydrocortisone 100mg Inj Co-amoxyclav (1.2 gm) Inj Piperacillin+Tazobactum (4.5 gm) Inj Levofloxacin 750mg Inj Amikacin 500 mg Inj Enoxaparine 40 mg Inj Enoxaparine 60 mg **Vaccines:** Influenza vaccine 23 valent Pneumococcal vaccine (PPSV 23) 13 valent Pneumococcal vaccine (PCV 13)	
District Hospitals and Super Speciality Hospitals	1.Nebulizer machine, 2. Fingertip Pulse Oximeter 3.Peak Flow Meter 4. Spirometer with CPU, Monitor and Printer 5. Arterial Blood Gas (ABG) analyzer 6. BIPAP 7. Invasive Ventilator ICU facility	**Inhalational drugs**: Tiotropium MDI Tiotropium+Formoterol (9/6 mcg per puff) MDI Salbutamol+Ipratropium MDI ICS+LABA- Formoterol+Budesonide (6mcg/200mcg) MDI, Salmeterol+Fluticasone(25mcg/250mcg) MDI Spacer with Valve **Respules/Respiratory Solutions For Nebulization:** Salbutamol respules Salbutamol+Ipratropium bromide respules Budesonide (0.5mg) respules Formoterol+Budesonide respules **Oral Medications:** Tablet. Prednisolone (20 mg/40mg) Tablet Doxophylline(400mg) Tablet Theophylline Sustained Release(400mg/450mg) Antibiotics-Co-Amoxyclav (625 mg), Cefpodoxime(200mg), Cefuroxime (500 mg), Azithromycin(500mg), Linezolid (600 mg), Clindamycin (300/600 mg) **Parenteral drugs**: Inj. Hydrocortisone 100mg Inj Co-amoxyclav (1.2 gm) Inj Piperacillin+Tazobactum (4.5 gm) Inj Meropenem 1 gm Inj Levofloxacin 750mg Inj Amikacin 500 mg Inj Netilmycin 300 mg Inj Clindamycin (300mg/600 mg) Inj Linezolid 600 mg Inj Enoxaparine 40 mg Inj Enoxaparine 60 mg **Vaccines:** Influenza vaccine 23 valent Pneumococcal vaccine (PPSV 23) 13 valent Pneumococcal vaccine (PCV 13)	