

# Medications to reduce emergency hospital admissions due to chronic obstructive pulmonary disease and asthma: policy brief

## Key Policy Considerations

Reducing emergency hospital admissions for certain chronic conditions can decrease the strain on health facilities and the healthcare workforce during the long arc of COVID-19. There are a few medications which affect hospital admissions for patients with such conditions like chronic obstructive pulmonary disease (COPD) and asthma. Among the Indian guidelines, recommended medications are:

1. **Long-acting muscarinic antagonists** like **tiotropium bromide** (moderate quality evidence) and **long-acting beta 2 agonists** like **formoterol and salmeterol** (moderate quality evidence) can reduce odds of hospital stay of **stable COPD patients** by 44% and decrease risk of hospital admission by 27% respectively.
2. **Inhaled corticosteroids** like **beclomethasone** and **short acting antimuscarinic agent** such as **ipratropium bromide** (moderate quality evidence) may be used early in **patients with acute asthma exacerbation** to reduce the risk of emergency admissions by 58% and 32% respectively.
3. **Fluticasone** (high quality evidence) increases the risk of pneumonia led hospitalization in patients with **moderate to severe stable COPD** by 81%.

### What is a policy brief?

A policy brief provides a summary of global research on a particular topic. This policy brief provides evidence from a **single overview of systematic reviews to inform decision-making** contextualised to a particular setting through review of guidelines.

### Why was this policy brief developed?

The State Health Resource Centre, Chattisgarh requested evidence to improve diagnosis and quality of care for asthma & COPD in the State. This policy brief is part of the **Ensuring Health Systems Capacity for COVID-19 and Beyond: Evidence Series**.

### Suggested citation

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# Medications to reduce emergency hospital admissions due to chronic obstructive pulmonary disease and asthma

Emergency hospital admissions are a costly event and a burden to health systems especially, during a pandemic like COVID-19, when capacities are already stressed. Health facilities and health workforces are overwhelmed with activities related to pandemic control<sup>1</sup>. Hospital emergencies due to chronic diseases, amid the outbreak, exhaust resources and increase pressures on acute healthcare services<sup>2</sup>. Identifying interventions to reduce emergency hospital admissions is a priority to ease the burden on health systems. We sought to identify medications that reduce emergency hospital admissions for chronic conditions like chronic pulmonary obstructive disease (COPD) and asthma.

## Methodology

We reviewed Indian guidelines for diagnosis and management of COPD, asthma and maintenance treatment of obstructive airway disease by home nebulization<sup>3,4,5</sup> published in last ten years. Two of these evidence-based guidelines<sup>3,4</sup> were developed as a collaborative effort of The Indian Chest Society (ICS) and the National College of Chest Physicians (NCCP, India). The document on home nebulization<sup>5</sup> was contextualized on the account of a consensus meeting jointly organized by National Allergy Asthma Bronchitis Institute (NAABI) and Chest Research Foundation (CRF) on the use of maintenance treatment of obstructive airway diseases like COPD and asthma at home. These were developed in order to help the physicians at all levels of healthcare to diagnose and manage these conditions in a scientific manner. We identified medicines recommended in the Indian guidelines and compared them with medications reported in the overview of systematic review<sup>2</sup> to identify which of them decrease hospital admission (Figure 1).

The policy brief presents a summary of evidence from a single high-quality overview of systematic reviews<sup>2</sup> of randomised controlled trials based on the medications recommended by the Indian guidelines.

We summarised effect estimates and also the quality of evidence using the WHO recommended GRADE criteria ([Table 1](#)).

# Summary of evidence on medications to reduce emergency hospital admissions due to chronic obstructive pulmonary disease and asthma

The overview of the systematic reviews by Bobrovitz et al<sup>2</sup> on identifying medications that affect hospital admissions had included 140 systematic reviews comprising of 1968 randomised controlled trials (RCTs), with a total of 925,364 patients. These patients had a follow-up period ranging from 1-72 months in different studies. Included RCTs were conducted majorly in high income countries, in patients from outpatient clinics, emergency departments, and in-patient settings of the hospitals. The mean age of the participants in the RCTs included in the systematic review ranged between 18-65 years.

**Medication interventions:** Of the 159 treatment comparisons, 28 medications were identified using GRADE criteria with high or moderate quality evidence that significantly reduced hospital admissions. Only five of these medications were recommended for management of COPD and asthma by the Indian Chest Society, National College of Chest Physicians, National Allergy Asthma Bronchitis Institute and Chest Research Foundation.

*Table 1: What GRADE Working Group grades of evidence implies*

GRADE Rating	What It Means
High Quality	We are very confident that the true effect lies close to that of the estimate of the effect
Moderate Quality	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low Quality	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very Low Quality	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Figure 1: Recommended medicines from the Indian guidelines reducing the hospital admission for COPD and Asthma.

Drug Class	Molecule	Name of the condition			
		Moderate to severe stable COPD	Acute asthma exacerbation	Chronic asthma	Home nebulization for managing obstructive airway disease (COPD and Asthma)
SABA	Salbutamol	NR	NR	NR	NR
SAMA	Ipratropium bromide	NR	↓	NR	↓
LABA	formoterol, salmeterol	↓	NR	NR	↓
LAMA	Tiotropium bromide	↓	NR	NR	↓
ICS	Momentasone Furoate; Beclomethasone, Fluticasone	Fluticasone* ↑	↓	NR	NR
ICS plus LABA	Momentasone Furoate/ Beclomethasone/Fluticasone + formoterol	↓	NR	↓	↓

SABA (salbutamol) or SAMA (ipratropium) or LABA (formoterol, salmeterol) or LAMA (tiotropium bromide) or ICS (Momentasone Furoate) are to be used as reliever therapy for all patients as and when needed.

SABA=Short-acting beta-agonists; SAMA=Short-acting antimuscarinic agent, LAMA=Long-acting antimuscarinic agent, LABA=Long-acting beta<sub>2</sub>-agonist; ICS=Inhaled corticosteroids, NR= Not Reported

\* Fluticasone used alone increases the pneumonia hospitalization in patient with moderate to severe stable COPD

↓ Reduction in hospital admissions for asthma and COPD

↑ Increase in hospital admissions for asthma and COPD

Key evidence on these five broad category of drugs recommended by Indian guidelines is summarised below:

- **Stable COPD patients-** Evidence suggests that administering **long-acting muscarinic antagonists** like **tiotropium bromide (moderate quality evidence)** results in 44% decrease in the odds of hospitalization (OR: 0.56 (0.31 to 0.99)) as compared to **ipratropium bromide**. Similarly, **tiotropium bromide** reduces the odds of hospital admission in COPD patients by 13% (OR 0.87 (0.77 to 0.99)) as compared to **Long acting beta-2-agonist**.
- **Long-acting beta 2 agonists** like **formoterol and salmeterol (moderate quality evidence)** when compared with placebo reduce the risk of hospital admission by 27%. (RR: 0.73 (0.63 to 0.83))
- **Long-acting beta 2 agonists** like **formoterol** when **combined** with inhaled **corticosteroids** like **Mometasone Furoate (low quality evidence)** when compared with placebo causes a 64% reduction in the odds of hospital admission (OR: 0.36 (0.15 to 0.86)).
- **Long-acting beta 2 agonists** like **formoterol (low quality evidence)** when administered decreases the odds of hospital admission for COPD by 27% as compared to placebo (OR: 0.73 (0.54 to 0.99)) Similarly **long-acting muscarinic antagonists** like **tiotropium bromide (low quality evidence)** when compared with placebo reduces the odds of hospital stay by 11% (OR: 0.89 (0.80 to 0.98)).
- **Acute asthma exacerbation-** Early use of inhaled **corticosteroids** like **beclomethasone** when compared with placebo reduces the risk of hospital admission from the emergency department by **58%**. **Short acting antimuscarinic agent** such as **ipratropium bromide** as compared to **short acting beta 2 agonists** like **salbutamol (moderate quality evidence)** reduces the risk of hospital admission from the emergency department **32%**. (RR: 0.42 (0.25 to 0.67); RR: 0.68 (0.53 to 0.86), respectively).
- **Chronic asthma-** Using **Long-acting beta 2 agonists** like **formoterol** along with inhaled **corticosteroids** at different doses (**low quality evidence**) as compared to administering only inhaled corticosteroids (either same dose as intervention or some higher dose) reduces the admission for asthma by 51%, 54% and 41% respectively (OR: 0.49 (0.25 to 0.95); OR: 0.46 (0.23 to 0.93); OR: 0.59 (0.37 to 0.93)).
- **Moderate to severe stable COPD-** Administering inhaled **corticosteroids** like **fluticasone** (high quality evidence) increases the risk of pneumonia hospitalization by **81%** (RR: 1.81 (1.51 to 2.17)) as compared to placebo.

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## Published Notes

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