2026 Volume: 01 Issue: 07 ISSN 1671-2838 Page No: 364-375

Pharmaceutical Care and Research

https://pcrjournal.com

Review Article

Volume: 01
Issue: 07

A REVIEW ON MANAGEMENT OF BRONCHIAL ASTHMA

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Article Received: 23 August 2026
Article Revised: 11 September 2026
Published on: 01 October 2026

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DOI: https://doi-doi.org/101555/ijpcr.9908

ABSTRACT

Bronchial asthma is fluctuating respiratory symptoms and fluctuating expiratory airflow limitation are hallmarks of bronchial asthma, a diverse chronic airway illness. Sustained symptom control, avoiding exacerbations, maintaining pulmonary function, reducing side effects from treatment, and preserving quality of life are all goals of effective management. An integrated approach that combines pharmaceutical treatment, environmental and trigger management, monitoring, patient education, adherence support, and customized therapy adjustment is supported by the literature evaluated in the uploaded material. While leukotriene receptor antagonists, long-acting muscarinic antagonists, inhaled corticosteroid/long-acting β2-agonist combinations, and certain biologic therapies offer additional options based on disease characteristics, inhaled corticosteroids continue to be the mainstay of long-term anti-inflammatory treatment. Written asthma action plans can improve adherence, self-management, and the ability to react quickly to worsening symptoms.Prompt severity assessment, proper bronchodilator and systemic corticosteroid medication, and specific adjuvant interventions in severe attacks are necessary for acute exacerbations. Although causality has not been proven, recent submitted data has linked low serum magnesium to acute exacerbation and worse lung function. Phenotype- and endotype-directed therapy, steroid-sparing techniques, and better inhaler use are becoming more and more important in emerging management. In general, asthma treatment should be customized, gradual, and constantly reevaluated, with the patient's active involvement and frequent expert evaluation.

KEYWORDS: Bronchial asthma; asthma management; inhaled corticosteroids; LABA; LAMA; biologic therapy; exacerbation; asthma action plan; self-management.

1. INTRODUCTION

A chronic inflammatory airway disease, bronchial asthma is characterized by fluctuating expiratory airflow restriction and respiratory symptoms. Recurrent wheeze, dyspnea, coughing, and tightness in the chest are possible clinical manifestations. The interplay of bronchial smooth-muscle contraction, mucosal edema, mucus production, and, in certain cases, airway remodeling is reflected in airway blockage. The long-term goal is to attain the highest quality of life and lung function while preventing attacks and functional limitation, rather than only relieving specific symptoms. [1]

Asthma is variable, with patients differing in severity, causes, inflammatory phenotype, comorbidities, and responsiveness to medication, according to modern management. Disease control, exacerbation prevention, quality of life enhancement, routine monitoring, and customized treatment are highlighted in a recent simplified review that separates management into pharmaceutical and non-pharmacological components. [7] In a similar vein, the adult clinical evaluation defines treatment as striking a balance between decreasing future risk, including exacerbations and adverse drug reactions, and reducing current disability. [3]

Therefore, control and risk assessment is the first step in the management process. This is followed by the choice of a suitable controller and reliever treatment, inhaler technique instruction, trigger and comorbidity management, and scheduled follow-up. A structured five-step approach is particularly recommended by the Indian guideline, with health education, trigger avoidance, environmental control, and comorbidity management being considered universal approaches for all patients. [2]

2. Goals and Principles of Management

Relieving existing symptoms, preventing disease progression and exacerbations, maintaining daily, professional, and recreational activities, and avoiding medication-related side effects are the objectives of asthma treatment. Pulmonary function, activity restriction, nocturnal symptoms, and daytime symptoms or rescue medicine use should all be considered when assessing asthma control. [2]

Treatment intensity should be commensurate with the patient's clinical status, according to a fundamental premise. It is not appropriate to categorize patients with uncontrolled asthma as having severe asthma. The literature on severe asthma places a strong emphasis on differentiating between difficult-to-control asthma brought on by poor adherence, improper inhaler technique, untreated comorbidities, or ongoing exposure to sensitizing agents and truly severe disease. [15]

Because each patient responds differently to inhaled corticosteroids, bronchodilators, and biologic therapy, individualization is also crucial. The 2026 overview highlights treatment customized to patient phenotype and disease endotype, indicating that precision-based care will gradually replace a standard regimen in future management. [7]

3. Assessment and Monitoring

Systematic evaluation of asthma control is necessary. According to Indian standards, pulmonary function, nocturnal symptoms or waking, daytime symptoms or rescue drug use, and activity limitation are all significant categories. [2] Repeated spirometric evaluation is advised by the adult review, especially when there is a clinically meaningful change in control; home peak-flow monitoring may be helpful for certain patients. [3]

Because symptoms may not always accurately reflect airway blockage, monitoring is crucial. Clinicians should examine exacerbation history, reliever use, adherence, inhaler technique, and exposure to pertinent triggers in addition to symptoms. According to the 2018 asthma-action-plan study, systematic monitoring and patient-provider communication can enhance treatment adherence and self-management. [4]

A key factor in determining the efficacy of treatment is proper inhaler technique. pMDIs and DPIs are the two main categories of inhalation devices, according to the most recent summary, which also highlights how method and device features affect drug delivery. [7] In a similar vein, Melani's assessment notes that improper or inadequate inhaler technique is a significant practical obstacle to successful asthma and COPD treatment. [21]

3.1 Assessment of adherence

Both deliberate and inadvertent poor adherence are possible. Patients may have financial difficulties, forget dosages, misinterpret directions, or worry about side effects. The 2018 randomized study explains adherence issues in detail and demonstrates how tailored communication and education can overcome these obstacles. [4]

3.2 Triggers and comorbidities

Assessment should include tobacco exposure, allergens, occupational irritants and relevant comorbid conditions. The adult review emphasizes individualized recognition and mitigation of environmental triggers. [3] In children, medical neglect can manifest as failure to recognize severe symptoms, non-adherence, continued allergen or tobacco exposure and inadequate supervision, all of which can contribute to poor control. [13]

4. Pharmacological Management

Controller or maintenance therapy and relief therapy are two categories of pharmacological treatment. While reliever medications offer quick relief during symptoms, controller medications are taken on a daily basis to lower airway inflammation and future danger. [1,7]

4.1 Inhaled corticosteroids

The mainstay of controller therapy is inhaled corticosteroids (ICS). According to the Indian guideline, ICS lower the risk of exacerbation and the requirement for reliever medication while also improving lung function, symptom scores, and quality of life. [2] In a similar vein, the adult evaluation highlights

the use of the lowest dose that preserves control and names ICS as the recommended anti-inflammatory treatment. [3] ICS's preventive benefits go beyond just relieving symptoms. In their evaluation of the connection between ICS use and preventing exacerbations, Jackson and Bacharier emphasized the significance of anti-inflammatory therapy in lowering the biological processes that put patients at risk for developing asthma. [19]

Because systemic and local side effects become more significant as exposure rises, high-dose ICS should not be administered needlessly. Therefore, the Indian guideline suggests utilizing spacers or valved holding chambers as necessary, and beginning with a suitable low-to-moderate dose and using the lowest effective dose. [2]

4.2 ICS/LABA therapy

Adding a LABA is a crucial step-up option when asthma is uncontrolled even with the right ICS treatment. According to the Indian guidelines, when symptoms are not under control with moderate-dose ICS, adding LABA to ICS is preferred rather than using LABA alone. [2]

Evidence summarized in the Indian guideline indicates that ICS/LABA combinations can improve lung function and asthma control and reduce exacerbations compared with ICS alone in appropriate patients. [2] The 2026 overview also includes ICS-LABA among the major maintenance treatment options. [7]

4.3 Maintenance-and-reliever therapy

Using the same inhaler, maintenance-and-reliever therapy (MART), especially with budesonide-formoterol, offers both controller and reliever treatment. Cusack and colleagues examined data showing that budesonide-formoterol, when used as maintenance and reliever medication, can lessen the chance of a severe exacerbation in the future while offering similar day-to-day control with less maintenance ICS exposure than certain traditional regimens. [16]

Infante and colleagues also discuss the SMART approach, emphasizing the avoidance of short-acting β2-agonist-only regimens and describing combination ICS-LABA treatment for both maintenance and immediate relief. [20] In higher treatment phases, the Indian guideline also favors formoterol-based single-inhaler therapy for both maintenance and relief. [2]

4. Pharmacological Management (continued)

4.4 Leukotriene receptor antagonists

receptors

For certain people, leukotriene receptor antagonists (LTRAs), such as montelukast, may be utilized as an alternate or supplemental treatment. Although LTRA may be helpful when inhaled medication is inappropriate or in certain individuals with related allergy disorders, the Indian guideline states that LTRA solo is generally inferior than ICS monotherapy for mild-to-moderate asthma. [2]

LTRA is one of the maintenance-treatment alternatives included in the 2026 overview. [7] For some patients, the oral route may be beneficial; nonetheless, medication selection should take specific patient features and relative efficacy into account.

4.5 LAMA therapy

In certain individuals whose symptoms do not improve with ICS/LABA treatment, long-acting muscarinic antagonists, especially tiotropium, are utilized as supplemental therapy. Tiotropium is one of the higher-step alternatives listed in the Indian guideline. [2] Kaplan and colleagues evaluated LAMA, LABA, and LTRA add-on techniques and discovered that, when added to ICS in adults, LAMA and LABA typically enhance lung function more than LTRA, supporting customized add-on therapy choices. [22]

Although the amount of benefit on exacerbation risk varies among trials, an overall assessment of triple ICS/LABA/LAMA therapy found that adding LAMA to ICS/LABA is an established strategy for uncontrolled asthma. [23]

4.6 Biologic therapy

In certain cases of severe asthma, biologic treatments are becoming more and more significant. While other biologics target eosinophilic or type-2 inflammatory pathways, omalizumab targets IgE-mediated allergic inflammation. According to the Indian guideline, individuals with moderate-to-severe asthma, high IgE, and evidence of persistent aeroallergen sensitization may be considered for omalizumab as an adjuvant to ICS. [2]

Vatrellaand associates evaluate the progress of anti-eosinophil biological treatments and discuss eosinophilic inflammation as a key therapeutic target in severe asthma. [17] Gon and associates examine the significance of IgE biology in therapy response and characterize omalizumab as an IgE-targeted strategy for severe allergic asthma. [25]

Only once severe asthma has been confirmed, inhaled medication has been optimized, adherence and inhaler technique have been evaluated, and pertinent comorbidities have been assessed should biologics be taken into consideration. A significant percentage of individuals referred for severe asthma may actually have uncontrolled but non-severe asthma, according to the severe-asthma analysis. [15]

5. Stepwise Treatment Approach

For stable asthma, the Indian guideline suggests a five-step procedure. At every stage, general measures are applicable. For patients with very infrequent symptoms, step 1 involves reliever treatment; step 2 introduces low-dose ICS as the preferred controller; step 3 uses low-dose ICS plus LABA; step 4 increases controller intensity and may add tiotropium or LTRA; and step 5 involves specialist-level options like biologic therapy or carefully chosen systemic corticosteroid use. [2]

Reassessment prior to escalation is a key component of stepwise management. Adherence, inhaler technique, trigger exposure, and comorbidities should be examined first if control is inadequate. [2, 3] When the real issue is insufficient pharmaceutical use or a changeable external cause, this strategy avoids needless escalation.

5.1 Stepping down

Treatment can be gradually lowered to the least effective regimen after asthma is under control. The Indian guideline offers a number of step-down strategies, such as lowering the dosage of ICS and removing or reducing add-on controllers in stable patients. [2]

The SHAMAL trial offers up-to-date proof of steroid decrease in benralizumab-treated severe eosinophilic asthma. Adults taking benralizumab were able to lower maintenance ICS exposure under controlled circumstances in that randomized phase 4 research, supporting the idea of steroid-sparing treatment in suitably chosen biologic responders. [24]

5.2 Treatment failure

The diagnosis should be examined and aggravating variables should be found when treatment doesn't seem to be working. When therapy fails, the older adult review specifically advises examining compliance, inhaling technique, diagnosis, and aggravating variables. [1] Despite advancements in pharmaceutical alternatives, this is still relevant.

6. Non-Pharmacological Management

Medication is supplemented by non-pharmacological therapies. Physical exercise, rehabilitation programs, avoiding allergies, medication-related triggers, food triggers, smoke and irritants, good nutrition, and lowering mental stress or anxiety are all included as possibly pertinent solutions in the 2026 review. [7]

6.1 Trigger and allergen management

Trigger avoidance should be tailored rather than applied indiscriminately. Patients should identify exposures that reliably aggravate symptoms and eliminate avoidable interaction. The adult review specifically includes mitigation of allergies, viruses and irritants in work, household and environmental contexts as part of a personalized approach. [3]

6.2 Tobacco cessation

One of the most important aspects of asthma treatment is quitting smoking. According to Indian guidelines, patients who smoke should quit, especially if they have asthma that is difficult to manage. [2]Karadogan and colleagues' 2024 review makes the case that, despite its significance in the treatment of asthma and COPD, tobacco cessation support is frequently disregarded. [14]

6.3 Physical activity and healthy lifestyle

In general, it is better to promote physical activity than to avoid it. Among the non-pharmacological strategies listed in the 2026 review are exercise and rehabilitation. [7] Although they shouldn't be promoted as alternatives to controller therapy, healthy eating habits and sensible weight control may help promote overall respiratory health.

6.4 Allergic and perioperative considerations

In certain instances, allergic sensitization may be clinically significant. The latest pediatric study on latex sensitization included children who had bronchial asthma or suspected asthma and emphasized

the importance of identifying the risk of perioperative hypersensitivity and latex sensitization. [9] When the clinical context suggests elevated risk, such evidence supports tailored allergy assessment.

6.5 Pediatric care and prevention of neglect

Recognition, supervision, and adherence by caregivers are critical components of treatment for children. According to Knox and colleagues' review, medical neglect may be a factor in poorly managed childhood asthma due to non-adherence, persistent exposure to smoke or allergens, inadequate supervision, and failure to notice severe symptoms. [13]

7. Management of Acute Exacerbations

An acute asthma attack needs to be evaluated and treated very away. Determining the severity and the best location for management is the first step. The Indian guideline places a strong emphasis on severity evaluation, immediate bronchodilator treatment, systemic corticosteroids for severe attacks, and escalation in the event of insufficient response. [2]

7.1 Bronchodilator therapy

The conventional first-line relief treatment for acute symptoms is short-acting β2-agonists, which quickly dilate the airways. In cases of severe exacerbations, ipratropium may be added. In a similar vein, the 2026 overview highlights the significance of short-acting antimuscarinics in severe acute asthma and characterizes SABAs as rapid-relief medications. [7]

7.2 Systemic corticosteroids

In cases of severe acute asthma, systemic glucocorticoids are advised and should be given as soon as possible. According to the Indian guideline, oral corticosteroids are typically just as effective as parenteral therapy, with the exception of extremely ill patients or those who cannot take oral medication. [2]

7.3 Magnesium

Magnesium has a potential bronchodilators role in acute asthma and is used as an adjunct in selected severe attacks. Recent uploaded evidence adds a different but related perspective by examining serum magnesium status across stable and exacerbated asthma. In a prospective observational study of 100 adults, mean serum magnesium was significantly lower in acute exacerbation than in stable asthma (1.62 ± 0.31 versus 1.98 ± 0.28 mg/dL; $p<0.001$). Hypomagnesemia occurred in 68.8% of exacerbation cases compared with 17.6% of stable cases. [8]

The same study found positive associations between serum magnesium and spirometric measures in the stable group and an inverse relationship between magnesium level and exacerbation frequency. Patients with three or more exacerbations annually had a mean magnesium level of 1.49 ± 0.33 mg/dL compared with 2.06 ± 0.22 mg/dL among patients with no exacerbations. [8] Because magnesium was measured observationally, the study supports association rather than causation and calls for randomized trials before routine supplementation is recommended.

7.4 Risk factors for severe attacks

The Indian guideline identifies previous mechanical ventilation, recent hospitalization or emergency visits, absence of ICS treatment, recent oral corticosteroid use, high reliever use, use of multiple medication classes, poor adherence, limited social support, NSAID exposure and comorbidities among risk factors for severe attacks. [2]

7.5 Follow-up after exacerbation

After an exacerbation, treatment should be reassessed, inhaler technique reviewed and a written action plan reinforced. Early follow-up is particularly important for patients with recurrent exacerbations or poor baseline control.

8. Severe Asthma and Biologics

Only after the diagnosis has been confirmed and modifiable factors have been addressed should severe asthma be identified. Cote and colleagues stress that even in specialized severe-asthma care, basic management principles—such as accurate diagnosis, identification of comorbidities, avoidance of exposure, regular assessment, and education—remain crucial and that severe asthma must be distinguished from uncontrolled or difficult-to-control disease. [15]

In a similar vein, the Indian guideline advises monitoring adherence and inhaler technique at every visit and taking into account asthma mimics and related disorders like obesity, rhinitis, obstructive sleep apnea, and gastroesophageal reflux syndrome. [2]

8.1 Eosinophilic and allergic phenotypes

Eosinophilic inflammation is a major therapeutic target in severe asthma. Vatrella and colleagues describe eosinophilic inflammation as a prominent endotype in many patients with severe disease and review anti-eosinophil biological strategies. [17] Allergic asthma may be treated with anti-IgE therapy in selected patients. The omalizumab literature describes IgE-targeted treatment as an important option for severe allergic asthma and discusses its role in controlling allergic inflammation. [25]

8.2 Steroid-sparing strategies

Long-term systemic corticosteroid exposure should be minimized whenever effective alternatives are available. The SHAMAL trial demonstrates the feasibility of reducing maintenance ICS in selected patients with severe eosinophilic asthma receiving benralizumab, providing evidence for a structured steroid-sparing approach. [24]

8.3 Bronchial thermoplasty and immunotherapy

The Indian guideline does not recommend routine bronchial thermoplasty because of insufficient high-quality evidence and potential treatment-period exacerbations. Single-allergen immunotherapy may provide modest benefit in selected mild-to-moderate allergic asthma, but it should not be used in severe or poorly controlled disease because of safety concerns. [2]

8.4 Severe asthma guidance

The Saudi Initiative for Asthma 2024 update emphasizes practical, evidence-based care across asthma severity levels and offers a comprehensive framework for diagnosis and management in both adults and children [18]. This kind of guideline-based assessment is especially important when patients need specialist or biologic treatment.

9. Adjunctive and Emerging Approaches

The management literature increasingly explores treatments that target specific inflammatory mechanisms, reduce steroid burden and improve treatment delivery. The 2026 overview identifies phenotype- and endotype-tailored therapies as a major direction in asthma management. [7]

9.1 Nutraceutical and mitochondrial approaches

The 2022 review of nutraceuticals and mitochondrial oxidative stress discusses the possible contribution of oxidative stress and mitochondrial dysfunction to asthma and evaluates compounds with antioxidant or metabolic effects. These interventions remain adjunctive and should not replace established anti-inflammatory therapy. [5]

9.2 Yupingfeng powder

Yupingfeng powder was assessed as an adjunct in adult bronchial asthma in the uploaded 2026 systematic review and meta-analysis. In 20 randomized trials with 1,896 participants, combined Yupingfeng and conventional biomedical therapy was linked to improvements in clinical response, several pulmonary-function parameters, and asthma-control measures when compared with conventional therapy alone. However, the authors also noted heterogeneity and methodological limitations, so the results should be interpreted cautiously. [6]

9.3 Magnesium and future research

The recent magnesium study provides a clinically relevant hypothesis that electrolyte status may be linked with asthma severity and exacerbation frequency. However, the observational design, modest sample and single-timepoint magnesium measurement limit causal inference. [8] Future randomized studies should determine whether correcting hypomagnesemia improves control or reduces exacerbations.

9.4 Triple therapy

Another developing strategy for uncontrolled asthma is triple ICS/LABA/LAMA therapy. The 2024 umbrella review acknowledged uncertainty regarding the exact magnitude of benefit for exacerbation prevention, but concluded that LAMA addition is a relevant strategy in patients who remain uncontrolled despite medium- or high-dose ICS/LABA [23].

10. Patient Education and Self-Management

Since the effectiveness of treatment depends on what patients do in between clinical visits, patient education is an essential component of managing asthma. A customized asthma action plan that

combined symptom and peak-flow domains with ongoing education and motivation was assessed in a 2018 randomized controlled study. [4]The intervention group showed more frequent early self-management of flare-ups and lower rates of emergency-department visits, hospitalization, ICU admission and sickness absence than the comparison group. Adherence to asthma action-plan instructions and trigger avoidance was also higher in the intervention group. [4] A written action plan should contain individualized instructions about usual medication, warning symptoms, triggers, treatment changes during worsening and when emergency care is required. The Indian guideline strongly recommends optimal self-management combining patient education, self-monitoring, regular physician review and a written asthma action plan. [2]

10.1 Communication and shared decision-making

The 2018 research places a strong emphasis on communication and collaboration between patients and healthcare providers. Longer consultations, information about drugs and illness causes, a review of inhaler use, and opportunity to determine their own triggers and decide on a treatment plan were all provided to patients in the intervention arm. [4]

When selecting inhaler devices, increasing or decreasing medication, thinking about biologics, or talking about long-term corticosteroid exposure, shared decision-making is very important. The goal is educated participation in a workable management plan rather than just compliance.

10.2 Inhaler education

Demonstration and return-demonstration of inhaler technique should be part of education. Instead of assuming that initial teaching is retained, the inhaler-device literature emphasizes technique as a persistent real-world problem that supports recurring assessment. [21]

CONCLUSION

An integrated strategy that includes anti-inflammatory medication, bronchodilation, trigger and risk factor management, monitoring, patient education, and collaborative decision-making is necessary for the management of bronchial asthma. While ICS/LABA combinations, LTRA, LAMA, and specific biologic medicines offer additional alternatives based on illness features, ICS continues to be the cornerstone of controller treatment.

Acute exacerbations need to be quickly assessed for severity and treated with systemic corticosteroids and inhaled bronchodilators, as well as certain supplementary therapies in cases of severe attacks. Although there is encouraging recent data connecting low serum magnesium to exacerbation and worse pulmonary function, this research is still observational and should not be taken as evidence that regular supplementation is advantageous.

A personalized action plan, accurate diagnosis, adherence, inhaler technique, trigger reduction, regular monitoring, and patient education are all essential to successful asthma management. As a result, modern management is best understood as a continuous cycle of assessment, treatment, education, monitoring, and adjustment, with increasing use of phenotype- and endotype-directed

therapies for patients with severe disease. This is the strongest general principle that emerges from the reviewed literature.

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