

TABLE 309-4 ASTHMA CONTROL

Characteristic	Controlled (all of the following)	Partly Controlled	Uncontrolled
Daytime symptoms	None (≤ 2 /week)	> 2 /week	Three or more features of partly controlled
Limitation of activities	None	Any	
Nocturnal symptoms/awakening	None	Any	
Need for reliever/rescue treatment	None (≤ 2 /week)	> 2 /week	
Lung function (PEF or FEV ₁)	Normal	$< 80\%$ predicted or personal best (if known)	

Abbreviations: FEV₁, forced expiratory volume in 1 s; PEF, peak expiratory flow.

symptoms, night awakening, need for reliever inhalers, limitation of activity, and lung function (Table 309-4). Avoidance of side effects and expense of medications are also important. There are several validated questionnaires for quantifying asthma control, such as the Asthma Quality of Life Questionnaire (AQLQ) and Asthma Control Test (ACT).

Stepwise Therapy For patients with mild, intermittent asthma, a short-acting β_2 -agonist is all that is required (Fig. 309-8). However, use of a reliever medication more than twice a week indicates the need for regular controller therapy. The treatment of choice for all patients is an ICS given twice daily. It is usual to start with an intermediate dose (e.g., 200 μg bid of beclomethasone dipropionate [BDP]) or equivalent and to decrease the dose if symptoms are controlled after 3 months. If symptoms are not controlled, a LABA should be added, which is most conveniently given by switching to a combination inhaler. The dose of controller should be adjusted accordingly, as judged by the need for a rescue inhaler. Low doses of theophylline or an antileukotriene may also be considered as an add-on therapy, but these are less effective than LABA. In patients with severe asthma, low-dose oral theophylline is also helpful, and when there is irreversible airway narrowing, the long-acting anticholinergic tiotropium bromide may be tried. If asthma is not controlled despite the maximal recommended dose of inhaled therapy, it is important to check compliance and inhaler technique. In these patients, maintenance treatment with an OCS may be needed, and the lowest dose that maintains control should be used. Occasionally omalizumab may be tried in steroid-dependent asthmatics who are not well controlled. Once asthma is controlled, it is important to slowly decrease therapy in order to find the optimal dose to control symptoms.

Education Patients with asthma need to understand how to use their medications and the difference between reliever and controller

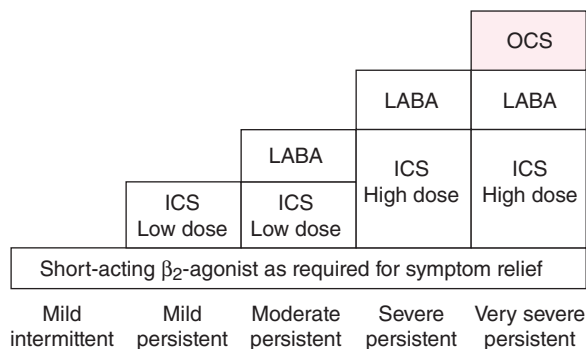


FIGURE 309-8 Stepwise approach to asthma therapy according to the severity of asthma and ability to control symptoms. ICS, inhaled corticosteroids; LABA, long-acting β_2 -agonist; OCS, oral corticosteroid.

therapies. Education may improve compliance, particularly with ICS. All patients should be taught how to use their inhalers correctly. In particular, they need to understand how to recognize worsening of asthma and how to step up therapy. Written action plans have been shown to reduce hospital admissions and morbidity rates in adults and children, and are recommended particularly in patients with unstable disease who have frequent exacerbations.

ACUTE SEVERE ASTHMA

Exacerbations of asthma are feared by patients and may be life threatening. One of the main aims of controller therapy is to prevent exacerbations; in this respect, ICS and combination inhalers are very effective.

Clinical Features Patients are aware of increasing chest tightness, wheezing, and dyspnea that are often not or poorly relieved by their usual reliever inhaler. In severe exacerbations, patients may be so breathless that they are unable to complete sentences and may become cyanotic. Examination usually shows increased ventilation, hyperinflation, and tachycardia. Pulsus paradoxus may be present, but this is rarely a useful clinical sign. There is a marked fall in spirometric values and PEF. Arterial blood gases on air show hypoxemia, and PCO_2 is usually low due to hyperventilation. A normal or rising PCO_2 is an indication of impending respiratory failure and requires immediate monitoring and therapy. A chest roentgenogram is not usually informative but may show pneumonia or pneumothorax.

TREATMENT ACUTE SEVERE ASTHMA

A high concentration of oxygen should be given by face mask to achieve oxygen saturation of $> 90\%$. The mainstay of treatment are high doses of SABA given either by nebulizer or via a metered-dose inhaler with a spacer. In severely ill patients with impending respiratory failure, IV β_2 -agonists may be given. A nebulized anticholinergic may be added if there is not a satisfactory response to β_2 -agonists alone, as there are additive effects. In patients who are refractory to inhaled therapies, a slow infusion of aminophylline may be effective, but it is important to monitor blood levels, especially if patients have already been treated with oral theophylline. Magnesium sulfate given intravenously or by nebulizer is effective when added to inhaled β_2 -agonists, and is relatively well tolerated but is not routinely recommended. Prophylactic intubation may be indicated for impending respiratory failure, when the PCO_2 is normal or rises. For patients with respiratory failure, it is necessary to intubate and institute ventilation. These patients may benefit from an anesthetic such as halothane if they have not responded to conventional bronchodilators. Sedatives should never be given because they may depress ventilation. Antibiotics should not be used routinely unless there are signs of pneumonia.

SPECIAL CONSIDERATIONS

Refractory Asthma Although most patients with asthma are easily controlled with appropriate medication, a small proportion of patients (approximately 5–10% of asthmatics) are difficult to control despite maximal inhaled therapy. Some of these patients will require maintenance treatment with OCS. In managing these patients, it is important to investigate and correct any mechanisms that may be aggravating asthma. There are two major patterns of difficult asthma: some patients have persistent symptoms and poor lung function, despite appropriate therapy, whereas others may have normal or near-normal lung function but intermittent, severe (sometimes life-threatening) exacerbations.

MECHANISMS The most common reason for poor control of asthma is noncompliance with medication, particularly ICS. Compliance with ICS may be low because patients do not feel any immediate clinical benefit or may be concerned about side effects. Compliance with ICS is difficult to monitor because there are no useful plasma measurements that can be made, but measuring the fractional excretion of