ASTHMA CONTROL IN GENERAL PRACTICE
Adapted from the GINA Global Strategy for
Asthma Management and Prevention

QUALITY IN PRACTICE COMMITTEE

AUTHORS
Dr Jean Holohan
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### Description of Levels of Evidence

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<thead>
<tr>
<th>Evidence Category</th>
<th>Sources of Evidence</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Randomised controlled trials (RCTs).</td>
<td>Evidence is from endpoints of well designed RCTs that provide a consistent pattern of findings in the population for which the recommendation is made. Category A requires substantial numbers of studies involving substantial numbers of participants.</td>
</tr>
<tr>
<td>B</td>
<td>Randomised controlled trials (RCTs).</td>
<td>Evidence is from endpoints of intervention studies that include only a limited number of patients, posthoc or subgroup analysis of RCTs, or meta-analysis of RCTs. In general, Category B pertains when few randomised trials exist, they are small in size, they were undertaken in a population that differs from the target population of the recommendation, or the results are somewhat inconsistent.</td>
</tr>
<tr>
<td>C</td>
<td>Nonrandomised trials.</td>
<td>Evidence is from outcomes of uncontrolled or nonrandomised trials or from observational studies.</td>
</tr>
<tr>
<td>D</td>
<td>Panel consensus judgement.</td>
<td>This category is used only in cases where the provision of some guidance was deemed valuable but the clinical literature addressing the subject was insufficient to justify placement in one of the other categories. The Panel Consensus is based on clinical experience or knowledge that does not meet the above-listed criteria.</td>
</tr>
</tbody>
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**ICGP Quality in Practice Committee**

Members: Dr Mel Bates, Dr Michael Boland, Mr Dermot Folan, Dr Elizabeth Maxwell, Dr Ailis ni Riain, Dr Seamus O’ Baoighill, Dr Ray O’ Connor, Dr Ben Parmeter, Dr Sheila Rochford, Dr Andree Rochfort, Dr Margaret O’ Riordan (chairperson)
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Introduction

Asthma, a chronic disorder, usually presents in early childhood. The prevalence worldwide is increasing with Ireland having one of the highest levels. When uncontrolled, asthma can place a significant social and economic burden on the individual, their family and society.

What is GINA?

During the past two decades, we have witnessed many scientific advances that have improved our understanding of asthma and our ability to manage and control it effectively. International surveys, including those based in Ireland, provide direct evidence for suboptimal asthma control despite the availability of effective therapies.

In 1993, the US National Heart, Lung, and Blood Institute in collaboration with the World Health Organisation presented a comprehensive plan to manage asthma with the goal of reducing chronic disability and premature deaths while allowing patients to lead productive and fulfilling lives. The Workshop: Global Strategy for Asthma Management and Prevention led to the implementation of the Global Initiative for Asthma (GINA), a worldwide network of individuals, organisations, and public health officials to disseminate information about the care of patients with asthma while at the same time assuring a mechanism to incorporate the results of scientific investigations into asthma care using evidence-based knowledge. In 2002, the GINA Report stated that “it is reasonable to expect that in most patients with asthma, control of the disease can, and should be achieved and maintained.” To meet this challenge the updated GINA guidelines not only incorporated updated scientific information but implemented an approach to asthma management based on asthma control, rather than severity. In order for local implementation to be effective it was clear that it must involve physicians charged with the care of such patients from day to day. Therefore I am delighted that the Irish College of General Practitioners has agreed to implement the evidenced-based International GINA Asthma Management and Treatment Guidelines. The Asthma Society of Ireland has worked closely with the ICGP in the preparation of this document and it is our hope that this will improve the care of people with asthma in Ireland.

Pat Manning
GINA Representative for Ireland
Chair, Medical Advisory Council Asthma Society of Ireland
Clinical Diagnosis: Is it Asthma?

Medical History
A clinical diagnosis of asthma is often prompted by symptoms such as episodic breathlessness, wheezing, cough, and chest tightness. Seasonal variability of symptoms and family history of asthma/atopic disease are also helpful diagnostic guides.

Symptoms
The classical symptoms are:
• Recurrent episodes of wheezing
• Troublesome cough at night
• Cough or wheeze after exercise
• Cough, wheeze or chest tightness after exposure to airborne allergens or pollutants
• Colds “go to the chest” or take more than 10 days to clear
• Are symptoms improved by appropriate asthma treatment?

Physical examination
Asthma symptoms are variable, therefore physical examination of the respiratory system may be normal. Wheezing on auscultation is the most common finding, but may only be detected when the person exhales forcibly, even in the presence of significant airway limitation.

Tests for Diagnosis and Monitoring

Measurements of lung function
Measurements of spirometry and peak expiratory flow provide an assessment of severity of airflow limitation, its reversibility and its variability, and provide confirmation of the diagnosis of asthma.

Spirometry
Spirometry is recommended as the ideal method to establish a diagnosis of asthma.
• **Reversibility** (improvements in FEV₁ within minutes after inhalation of rapid-acting bronchodilator or sustained improvement over days/weeks after introduction of effective controller treatment such as inhaled glucocorticosteroids). The degree of reversibility in FEV₁ which indicates a diagnosis of asthma is accepted as >12% (or >200ml) from pre-bronchodilator value.
• **Variability** (improvement or deterioration occurring over time, day to day, month to month or seasonally). Obtaining a history of variability is an essential component of the diagnosis of asthma.

Peak expiratory flow
Measurements of PEF are not interchangeable with FEV₁. PEF should be measured first thing in the morning, before treatment is taken, when values are at their lowest and last thing at night when values are usually higher.
• A 60 L/min (or >20% of pre-bronchodilator PEF) improvement after inhalation of a bronchodilator or a diurnal variation in PEF >20% suggests a diagnosis of asthma.
Measurement of airway responsiveness
For patients with symptoms consistent with asthma, but with normal spirometry, measurements of airway responsiveness to methacholine, histamine, mannitol, or exercise challenge may help establish a diagnosis of asthma. These are generally performed in a pulmonary function facility.

Measurement of allergic status
Measurement of allergic status (IgE, RAST, skin allergy tests) can help to identify risk factors that cause asthma symptoms in individual patients. The presence of allergies, eczema, and allergic rhinitis in particular, increase the probability of a diagnosis of asthma. Skin tests with allergens represent the primary diagnostic tool in determining allergic status. They are simple and rapid to perform, have a low cost and high sensitivity. When performed incorrectly skin tests can lead to false positive or false negative results. Measurement of specific IgE in serum does not surpass the reliability of results from skin tests and is more expensive. Measurement of total IgE in serum has no diagnostic value as a diagnostic test for atopy.

Diagnostic Challenges

Children 5 years and younger
The diagnosis of asthma in early childhood is challenging and has to be based largely on clinical judgment and an assessment of symptoms and physical findings. Since the use of the label “asthma” for wheezing in children has important clinical consequences, it must be distinguished from other causes of persistent and recurrent wheeze.

The elderly
New onset, undiagnosed asthma is a frequent cause of treatable respiratory symptoms in the elderly. The presence of co-morbid disease may complicate the diagnosis.
Wheeze, breathlessness and cough are consistent with both asthma and left ventricular failure. Use of beta-blockers, even topically for glaucoma, is common in this age group. Poor perception of symptoms by patients, coupled with acceptance of dyspnoea as being “normal” in old age, and reduced expectations of mobility and activity can delay diagnosis. A careful history and physical examination, combined with an ECG and chest X-ray, usually clarifies the picture. In the elderly, distinguishing asthma from COPD is particularly difficult, and may require a trial of treatment with bronchodilators and/or oral/inhaled glucocorticosteroids.

Occupational asthma
Due to its insidious onset occupational asthma is often misdiagnosed as chronic bronchitis or COPD. Development of new symptoms of rhinitis, cough, and/or wheeze particularly in non-smokers should raise suspicion.

PROBE:
- Work history and exposure
- History of occupational exposure to known or suspected sensitising agents
- An absence of asthma symptoms before beginning employment or
- A definite worsening of asthma after employment
- Improvement of symptoms away from work/worsening of symptoms on return

Monitor PEF at least 4 times/day at work for 2 weeks and for a similar period away from work. Since the management of occupational asthma may require the patient to change employment, the diagnosis carries considerable socioeconomic implications.
Asthma Management

Goals of long-term management
• Achieve and maintain control of symptoms
• Maintain normal activity levels, including exercise
• Maintain pulmonary function (FEV₁/PEF) as close to normal as possible
• Prevent asthma exacerbations
• Avoid adverse effects from asthma medications
• Prevent asthma mortality

Asthma can be effectively controlled in most patients by intervening to suppress and reverse inflammation as well as treating bronchoconstriction and related symptoms.

Recommendations for asthma management: 4 Interrelated Components
1. Develop Doctor/Patient Partnership
2. Identify and Reduce Exposure to Risk Factors
3. Assess, Treat and Monitor Asthma
4. Manage Asthma Exacerbations

COMPONENT 1: Develop Doctor/Patient Partnership

The effective management of asthma requires the development of a partnership between the person with asthma and his/her healthcare professional. The aim of this partnership is to enable patients to gain the knowledge, confidence and skills to assume a role in the management of their asthma. This approach is called guided self-management and has been shown to reduce asthma morbidity in both adults (Evidence A) and children (Evidence A).12-25

Essential features:
• Education and motivation
• Joint setting of goals
• Self-monitoring to assess control with educated interpretation of key symptoms
• Regular review of asthma control, treatment and skills
• Written action plan – medications to use regularly, medications to use as needed and how to adjust treatment in response to worsening control (see figure 1, page 7 for sample plan)
• Self-monitoring is integrated with written guidelines for both long-term treatment of asthma and treatment of exacerbations

Provide specific information, training and advice on:
• Diagnosis
• Difference between “relievers” and “controllers”
• Use of inhaler devices (observe patient technique at review and especially during exacerbation)
• Prevention of symptoms and attacks
• Signs that suggest that asthma is worsening and actions to take
• Monitoring of asthma control
• How and when to seek medical attention
### Example Of Contents Of Action Plans To Maintain Asthma Control

<table>
<thead>
<tr>
<th>Your Regular Treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Each day take ________</td>
</tr>
<tr>
<td>2. Before exercise, take ________</td>
</tr>
</tbody>
</table>

**WHEN TO INCREASE TREATMENT**

**Assess your level of Asthma Control**

In the past week have you had:

- Daytime asthma symptoms more than 2 times?  No Yes
- Activity or exercise limited by asthma?  No Yes
- Waking at night because of asthma?  No Yes
- The need to use your [rescue medication] more than 2 times?  No Yes
- If you are monitoring peak flow, peak flow less than ________?  No Yes

If you answered YES to three or more of these questions, your asthma is uncontrolled and you may need to step up your treatment.

**HOW TO INCREASE TREATMENT**

STEP-UP your treatment as follows and assess improvement every day:

[Write in next treatment step here] ________

Maintain this treatment for ________ days [specify number]

**WHEN TO CALL THE DOCTOR/CLINIC**

Call your doctor/clinic: ________ [provide phone numbers]

If you don't respond in ________ days [specify number]

[optional lines for additional instruction]

**EMERGENCY/SEVERE LOSS OF CONTROL**

- If you have severe shortness of breath, and can only speak in short sentences,
- If you are having a severe attack of asthma and are frightened,
- If you need your reliever medication more than every 4 hours and are not improving.

1. Take 2 to 4 puffs ________ [reliever medication]
2. Take ________ mg of ________ [oral glucocorticosteroid]
3. Seek medical help: ________

Go to ________
Address ________
Phone: ________

4. Continue to use your ________ [reliever medication] until you are able to get medical help.

Available for download from www.asthmasociety.ie
COMPONENT 2: Identify and Reduce Exposure to Risk Factors

Asthma exacerbations may be caused by a variety of factors, including allergens, viral infections, pollutants and drugs. Reducing a patient’s exposure to some of these risk factors (e.g., tobacco smoke, identified occupational agents, and avoiding foods/additives/drugs known to cause symptoms) improves the control of asthma and reduces medication needs. In the case of other known triggers (e.g., allergens, viral infections and pollutants) measures should be taken to avoid these. Many patients react to multiple factors ubiquitous in the environment. Avoiding these factors is usually impractical and very limiting for the patient. **Medications to maintain asthma control have an important role because patients are often less sensitive to risk factors when their asthma is under good control.**

**Smoking**
Avoidance of passive and active smoking is the most important measure for both adults and children.

**Indoor allergens**
- **House dust mites:** Live and thrive in many sites throughout the house, difficult to reduce and impossible to eradicate. Single measures to reduce exposure to mite allergens are not effective in reducing asthma symptoms in adults (Evidence A).26-29
- **Furred animals:** Complete avoidance of pet allergens is impossible as the allergens are ubiquitous and found in many environments outside the home.30 Removal of such animals from the home is encouraged, but it can be months before allergen levels decrease.31
- **Fungi:** Fungal exposure can exacerbate asthma, spores can be reduced by removing/cleaning mould-laden objects.32 Air conditioning and sealing of windows have been associated with increases in fungal and house dust mite allergens.33

**Outdoor allergens**
Pollen and moulds are impossible to avoid completely. Reduce exposure by closing doors and windows, remaining inside when pollen and mould counts are high.

**Outdoor air pollutants**
Most epidemiological studies show a significant association between air pollutants (e.g., ozone, nitrogen oxides, acidic aerosols and particulate matter) and exacerbations of asthma.34 Practical steps to take during unfavourable environmental conditions include avoiding strenuous physical activity in cold weather, low humidity, or high air pollution.

**Food and food additives**
Food allergy as an exacerbating factor for asthma is uncommon and occurs mainly in young children. Food avoidance should not be recommended until an allergy has been clearly demonstrated (usually by oral challenges).35 When food allergy is demonstrated, the patient should be referred to a specialist in that area.

**Drugs**
Aspirin and other nonsteroidal anti-inflammatory drugs can cause severe exacerbations and should be avoided in patients with a history of reacting to these agents.36 Beta-blocker drugs administered orally or intraocularly may exacerbate bronchospasm (Evidence A) and close medical supervision is essential when these are used by patients with asthma.37 Aspirin and other nonsteroidal anti-inflammatory drugs can cause severe exacerbations in up to 28% of adults with asthma and should be avoided in patients with a history of reacting to these agents.

**Flu vaccine**
Patients with moderate to severe asthma should be advised to receive an influenza vaccination every year or at least when vaccination of the general population is advised. Pneumococcal vaccination may be considered for at-risk populations, especially those with severe asthma.

**Other factors that may exacerbate asthma**
- **Rhinitis, sinusitis and polyposis** are frequently associated with asthma and need to be treated. However sinusitis and asthma may simply coexist.
- **Gastroesophageal reflux** can exacerbate asthma, and symptoms may improve when reflux is corrected.38,39
- **Hormones:** Premenstrual and menstrual exacerbations are well recognised.40 Asthma may improve, worsen or remain unchanged during pregnancy.41
COMPONENT 3: Assess, Treat and Monitor Asthma

The goal of asthma treatment, to achieve and maintain clinical control, can be reached in the majority of patients with a pharmacologic intervention strategy developed between the patient/family and the doctor. Patients are assigned to one of 5 treatment steps depending on their current level of control and treatment is adjusted in a continuous cycle driven by changes in their asthma control status. This cycle involves:

- Assessing asthma control
- Treating to achieve control
- Monitoring to maintain control

Assessing the level of asthma control

Every patient should be assessed to establish his/her current treatment regimen, adherence to the current regimen, and the level of asthma control. A simplified scheme for recognising controlled, partly controlled and uncontrolled asthma in a week is shown below (see figure 2).

Figure 2. Assessing the level of asthma control

<table>
<thead>
<tr>
<th>CHARACTERISTIC</th>
<th>CONTROLLED (All of the following)</th>
<th>PARTLY CONTROLLED (Any measure present in any week)</th>
<th>UNCONTROLLED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime symptoms</td>
<td>None (≤ twice/week)</td>
<td>More than twice/week</td>
<td>Three or more features of partly controlled asthma in any week.</td>
</tr>
<tr>
<td>Limitation of activities</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Nocturnal symptoms/awakening</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Need for reliever/rescue treatment*</td>
<td>None (≤ twice/week)</td>
<td>More than twice/week</td>
<td></td>
</tr>
<tr>
<td>Lung function (PEF or FEV₁)</td>
<td>Normal</td>
<td>&lt;80% predicted or personal best</td>
<td></td>
</tr>
<tr>
<td>Exacerbations</td>
<td>None</td>
<td>One or more/year</td>
<td>One in any week</td>
</tr>
</tbody>
</table>

*Any exacerbation should prompt a review of maintenance treatment to ensure that it is adequate. By definition, an exacerbation in any week makes that an uncontrolled asthma week.

*2 puffs/week = 1 canister of rescue medication MDI/year (approx 200 doses/canister)
1 canister dispensed every month is equivalent to 6 puffs/day

Complete control of asthma is commonly attained with treatment, the aim of which should be to achieve and maintain control for prolonged periods with due regard to safety of treatment, potential for adverse effects, and cost.

Validated measures for assessing clinical control of asthma provide values to distinguish different levels of asthma control.

Validated measures include:
The Asthma Control Test (ACT)** (www.asthmacontroltest.com)
The Asthma Control Questionnaire (ACQ)**
Treating to achieve control

The patient's current level of asthma control and treatment determines required changes. For example, if asthma is not controlled on the current treatment regimen, treatment should be stepped up until control is achieved. If control has been maintained for at least three months, treatment can be stepped down with the aim of establishing the lowest step and dose of treatment that maintains control. If asthma is partly controlled, an increase in treatment should be considered, subject to whether more effective treatments are available (e.g. increased dose or an additional treatment), safety and cost. The 5 step scheme below is based on these principles.

Most of the medications available for asthma patients, when compared with medications for other chronic diseases, have extremely favourable therapeutic ratios.

Components 1 and 2 are essential to management of Steps 1 to 5.

**Step 1: As-needed reliever medication**

As-needed reliever medication is reserved for:

- Untreated patients with occasional daytime symptoms of cough/wheeze/dyspnoea occurring twice or less/week, lasting only a few hours
- Patients who are asymptomatic between episodes, with normal FEV1
- Patients with no nocturnal wakening

For the majority of patients a rapid-acting inhaled $\beta_2$-agonist is the recommended reliever treatment (Evidence A). An inhaled anticholinergic, short-acting oral $\beta_2$-agonist, or short-acting theophylline may be considered as alternatives, but they have a slower onset of action and a higher risk of side effects (Evidence A). When symptoms are more frequent, and/or worsen periodically, patients require regular controller medication (Step 2 or higher) in addition to as-needed reliever medication.

**Step 2: Reliever medication plus a single controller**

A low-dose inhaled glucocorticosteroid (ICS) is recommended as the initial controller treatment for asthma patients of all ages (Evidence A). Alternative controller medications include leukotriene modifiers (Evidence A) appropriate for patients unable/unwilling to use ICS, or who experience intolerable side effects such as persistent hoarseness from ICS. Sustained-release theophylline has only weak anti-inflammatory and controller efficacy (Evidence B), is commonly associated with side effects (Evidence A) and is not recommended for routine use as initial or first-line controllers in Step 2. Cromones have comparatively low efficacy, though a favourable safety profile (Evidence A).

**Step 3: Reliever medication plus one or two controllers**

The recommended option for adolescents and adults is to combine a low dose of ICS with an inhaled long-acting $\beta_2$-agonist, either in a combination inhaler or as separate components (Evidence A). Due to the additive effect of this combination, the low dose of ICS is usually sufficient, and need only be increased if control is not achieved within 3-4 months with this regimen (Evidence A). If a combination inhaler containing formoterol and budesonide is selected, it may be used for both rescue and maintenance. This approach has been shown to result in reductions in exacerbations and improvements in asthma control in adults and adolescents at relatively low doses of treatment (Evidence A).

Another option, for both adults and children, is to increase to a medium-dose ICS (Evidence A). For patients of all ages on medium- or high-dose ICS delivered by a pressurised metered-dose inhaler, use of a spacer device is recommended to improve delivery to the airways, and reduce systemic absorption (Evidence A).

Another option at Step 3 is to combine low-dose ICS with leukotriene modifiers (Evidence A) or alternatively the use of slow-release theophylline at low dose may be considered (Evidence B).
**Step 4: Reliever medication plus two or more controllers**

The selection of treatment at Step 4 depends on prior selections at Steps 2 and 3. The order in which additional medications should be added is based upon evidence of their relative efficacy in clinical trials. Where possible, patients not controlled on Step 3 should be referred to a health professional with expertise in the management of asthma for investigation of alternative diagnoses and/or causes of difficult-to-treat asthma.

The preferred treatment at Step 4 is to combine a medium- or high-dose ICS with a long acting inhaled β₂-agonist. However, in most patients, the increase from a medium- to a high-dose ICS provides relatively little additional benefit. The high dose is recommended only on a trial basis for 3 to 6 months when control cannot be achieved with a medium-dose ICS combined with a long-acting β₂-agonist and/or a third controller (e.g leukotriene modifiers or sustained release theophylline).

At medium and high doses, twice-daily dosing is necessary for most but not all ICS. With budesonide, efficacy may be improved with more frequent dosing.

**Difficult-to-treat asthma**

Patients who do not reach an acceptable level of control at Step 4 can be considered to have difficult-to-treat asthma. These patients may have an element of poor glucocorticosteroid responsiveness, may require higher doses of ICS, no evidence to support continuing these high doses of ICS beyond 6 months, or few patients are completely resistant to glucocorticosteroids, these remain a mainstay of therapy for difficult-to-treat asthma.

**Step 5: Reliever medication plus additional controller options**

Addition of oral glucocorticosteroids to other controller medications may be effective but is associated with severe side effects and should only be considered if the patient’s asthma remains severely uncontrolled on Step 4 medications with daily limitation of activities and frequent exacerbations. Patients should be counselled about potential side effects. Addition of anti-IgE treatment has been shown to improve control of severe allergic asthma when control has not been achieved on combinations of other controllers including high doses of inhaled or oral glucocorticosteroids.

**Monitoring to maintain control**

When asthma control has been achieved, ongoing monitoring is essential to maintain control and to establish the lowest step and dose of treatment necessary, which minimises cost and maximises the safety of treatment. Asthma is a variable disease, and treatment has to be adjusted periodically in response to loss of control as indicated by worsening symptoms or the development of an exacerbation. Asthma control should be monitored by the healthcare professional and also by the patient at regular intervals. Frequency of visits depends on initial clinical severity, and on patient's training and confidence in playing a role in the ongoing control of his/her asthma.

**Duration and adjustments to treatment**

For most classes of controller medications, improvement begins within days of initiating treatment, but the full benefit may only be evident after 3 to 4 months. The reduced need for medication once control is achieved is not fully understood, but may reflect the reversal of some of the consequences of long-term inflammation. At other times treatment may need to be increased either in response to loss of control or an acute exacerbation (defined as a more acute and severe loss of control that requires urgent treatment).

**Stepping down treatment when asthma is controlled**

There is little experimental data on optimal timing. Changes should be made by agreement between the patient and the healthcare professional, with discussion of potential consequences including reappearance of symptoms and increased risk of exacerbations.
Some recommendations can be made based on current evidence

- If ICS alone is being used in medium to high doses, a 50% reduction in dose should be attempted at 3-month intervals\(^ {102-108}\) (Evidence B).
- Where control is achieved with low-dose ICS alone, in most patients treatment may be switched to once-daily dosing\(^ {110-111}\) (Evidence A).
- When control is achieved with ICS and long-acting \(\beta_2\)-agonist the preferred approach is to begin by reducing the dose of ICS by approx 50% while continuing the long-acting \(\beta_2\)-agonist\(^ {112}\) (Evidence B). If control is maintained, further reductions in ICS should be attempted until a low dose is reached, when the long-acting \(\beta_2\)-agonist may be stopped (Evidence D).
- Controller treatment may be stopped if the patient’s asthma remains controlled on the lowest dose of controller and no recurrence of symptoms occurs for one year (Evidence D).

Estimated Equipotent Daily Doses of Inhaled Glucocorticosteroids for Adults

<table>
<thead>
<tr>
<th>Drug</th>
<th>Low Daily Dose (g)</th>
<th>Medium Daily Dose (g)</th>
<th>High Daily Dose (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>200 - 500</td>
<td>&gt;500 - 1000</td>
<td>&gt;1000 - 2000</td>
</tr>
<tr>
<td>Budesonide</td>
<td>200 - 400</td>
<td>&gt;400 - 800</td>
<td>&gt;800 - 1600</td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>80 - 160</td>
<td>&gt;160 - 320</td>
<td>&gt;320 - 1280</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>100 - 250</td>
<td>&gt;250 - 500</td>
<td>&gt;500 - 1000</td>
</tr>
<tr>
<td>Mometasone furoate</td>
<td>200 - 400</td>
<td>&gt;400 - 800</td>
<td>&gt;800 - 1200</td>
</tr>
</tbody>
</table>

\(^1\) Comparisons based upon efficacy data.

Notes: Designation of low, medium, and high doses is provided from manufacturers recommendations where possible. Clear demonstration of dose-response relationships is seldom provided or available. The principle is therefore to establish the minimum effective controlling dose in each patient, as higher doses may not be more effective and are likely to be associated with greater potential for adverse effects.

Stepping up treatment in response to loss of control

Treatment has to be adjusted periodically in response to worsening control, which may be recognised by the minor recurrence or worsening of symptoms\(^ {113}\). Treatment options are:

**RAPID-ONSET, SHORT-ACTING OR LONG-ACTING \(\beta_2\)-AGONIST BRONCHODILATORS**

The need for repeated doses over more than one or two days signals the need for review and possible increase of controller therapy.

**INHALED GLUCOCORTICOSTEROID**

Temporarily doubling the dose of ICS has not been shown to be effective, and is no longer recommended \(^ {114-115}\) (Evidence A). A four-fold or greater increase has been demonstrated to be equivalent to a short course of oral glucocorticosteroids in adult patients with acute deterioration\(^ {113}\) (Evidence A). The higher dose should be maintained for 7 to 14 days, more research is needed in both adults and children to standardise this approach.

**COMBINATION OF ICS AND RAPID AND LONG-ACTING \(\beta_2\)-AGONIST**

Combination of ICS and rapid and long-acting \(\beta_2\)-agonist (e.g. formoterol) in a single inhaler both as a controller and reliever is effective in maintaining a high level of asthma control and reduces exacerbations requiring systemic steroids and hospitalisation\(^ {51,77,78,116}\).

In patients considered to have difficult-to-treat asthma, consider the following:

- Confirm diagnosis of asthma
- Investigate and confirm compliance with treatment; review inhaler technique
- Consider smoking, current or past
- Investigate comorbidities (chronic sinusitis, gastroesophageal reflux, and obesity/obstructive sleep apnoea)

A compromise level of control may need to be accepted and discussed with the patient to avoid futile over-treatment and its attendant cost and potential for adverse effects. For these patients, frequent use of rescue medication is accepted, as is a degree of chronic lung function impairment. Referral to a physician with an interest in and/or special focus on asthma may be helpful in identifying patients in categories such as allergic, aspirin-sensitive, and/or eosinophilic asthma. Anti-IgE therapy maybe of benefit to allergic asthma\(^ {102}\) and leukotriene modifiers can be helpful in aspirin-sensitive patients.
As needed rapid-acting $\beta_2$-agonist

**CONTROLLER OPTIONS**

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<tr>
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<tbody>
<tr>
<td>Low-dose inhaled ICS*</td>
<td>Low-dose ICS plus long-acting $\beta_2$-agonist</td>
<td>Medium- or high-dose ICS plus long-acting $\beta_2$-agonist</td>
<td>Oral glucocorticosteroid (lowest dose)</td>
</tr>
<tr>
<td>Leukotriene modifier</td>
<td>Medium- or high-dose ICS</td>
<td>Leukotriene modifier</td>
<td>Anti-IgE treatment</td>
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<tr>
<td>Low-dose ICS plus leukotriene modifier</td>
<td>Sustained release theophylline</td>
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<td>Low-dose ICS plus sustained release theophylline</td>
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LABAs should always be used in association with inhaled glucocorticosteroids

Alternative reliever treatments include inhaled anticholinergics, short-acting oral $\beta_2$-agonists, some long-acting $\beta_2$-agonists, and short-acting theophylline. Regular dosing with short- and long-acting $\beta_2$-agonists is not advised unless accompanied by regular use of an inhaled glucocorticosteroid.

Available for download from [www.asthmasociety.ie](http://www.asthmasociety.ie)
COMPONENT 4: Manage Asthma Exacerbations

Assessment

- Exacerbations of asthma are episodes of progressive increase in shortness of breath, cough, wheezing, or chest tightness, or some combination of these symptoms. Respiratory distress is common.
- Exacerbations are characterised by decreases in expiratory airflow that can be quantified by measurement of lung function with spirometry (FEV₁) or peak flow (PEF). These measurements are more reliable indicators of the severity of airflow limitation than symptoms.
- A minority of patients perceive symptoms poorly (especially in patients with a history of near-fatal asthma) and may have a significant decline in lung function without a significant change in symptoms.
- Milder exacerbations, defined by a reduction in peak flow of less than 20%, nocturnal wakening and increased use of short-acting β₂-agonists can usually be treated in a community setting. If the patient responds to the first few doses of inhaled bronchodilator therapy, referral to an acute facility is not required, but further management may include the use of systemic glucocorticosteroids. Patient education and review of maintenance therapy should be undertaken.
- Patients at high risk of asthma-related death require closer attention and should be advised to seek urgent care early in the course of their exacerbation. These include patients with:
  - a history of near-fatal asthma requiring intubation and ventilation.
  - an A&E visit or hospitalisation in the past year.
  - current use or have recently stopped oral corticosteroids.
  - an over dependence on rapid-acting β₂-agonists, especially those who use more than one canister of salbutamol (or equivalent) monthly.
  - a history of psychiatric disease or psychosocial problems, including the use of sedatives.
  - a history of noncompliance with an asthma medication plan.

It should be remembered that more than one person in Ireland dies every week from asthma.

Treatment

The primary therapies for exacerbation to relieve airflow obstruction and hypoxemia are:
- Repetitive administration of rapid-acting inhaled β₂-agonist bronchodilator
- Early introduction of systemic glucocorticosteroids
- Oxygen supplementation
- The clinician can decide if antibiotic therapy is appropriate

Bronchodilators – repeated administration of rapid-acting inhaled β₂-agonist

Bronchodilator therapy delivered via a metered-dose inhaler (MDI), ideally with a spacer, produces at least an equivalent improvement in lung function as the same dose delivered via nebulizer. This route of delivery is the most cost effective, provided patients are able to use an MDI.

Mild exacerbations: 2-4 puffs every 20 minutes for first hour, followed by 2-4 puffs every 3 to 4 hours. Moderate exacerbations: 2-4 puffs every 20 minutes for first hour, followed by 6-10 puffs every 1 to 2 hours. No additional medication is necessary if the rapid-acting inhaled β₂-agonist produces a complete response (FEV₁ or PEF returns to greater than 80% of predicted or personal best) and the response lasts for 3 to 4 hours.

Glucocorticosteroids

Oral glucocorticosteroids (0.5 to 1 mg of prednisolone/kg or equivalent during a 24-hour period) should be used to treat exacerbation, especially if they develop after instituting other short-term treatment options recommended for loss of control. If the patient fails to respond to bronchodilator therapy, as indicated by persistent airflow obstruction, prompt transfer to an acute care setting is recommended, especially if they are in a high-risk group. Response to treatment may take time. Patients should be closely monitored using clinical and objective measures. Response to treatment should continue until measurements of lung function (FEV₁ or PEF) return ideally to previous best or plateau. Patients who can be safely discharged will have responded within the first few hours.
When to consider referring on?
Patients with a severe exacerbation often present with dyspnoea at rest, can be hunched forward with an audible loud wheeze, look agitated or drowsy and confused and usually have a tachypnoea and tachycardia and FEV₁ or PEF < 60% predicted or personal best (<100 L/min adults) or a β₂-agonist response which lasts less than 2 hours. Severe exacerbations are potentially life threatening and require close supervision. Close objective monitoring (FEV₁ or PEF) of response to therapy is essential. Most patients with severe asthma exacerbations should be referred on to an acute care facility (such as a hospital emergency department) where monitoring, including objective measurement of airflow obstruction, oxygen saturation, and cardiac function, is possible.

Management in an acute care setting is detailed in the GINA ‘Global Strategy for Asthma Management and Prevention’ [www.ginasthma.org](http://www.ginasthma.org)
References


PATIENT INFORMATION

Patient Education Resources available from Asthma Society of Ireland:

‘Take Control of Your Asthma’
‘Asthma and Allergic Rhinitis’
‘Asthma in Babies and Young Children’
‘Best Practice Asthma Management Guidelines for Primary Schools in Ireland’
‘Peak Flow and Symptom Diary, Treatment Diary and Action Plan’
‘Asthma Attack Card’
‘Top Tips on Exercising with Asthma’ (DVD, Poster, Booklet)
DVD ‘Inhaler Technique, How to use Spacer Devices and Peak Flow Meters’ – also see website
‘Asthma in Pregnancy’

All booklets are available free of charge or can be downloaded from website; see ‘Publications’
Additional information on website www.asthmasociety.ie

PRACTICE RESOURCES

Available for download from www.asthmasociety.ie

- Additional copies of these guidelines
- Personal Asthma Action Plans
- Management Approach Based on Control, 5 Step Plan
- Spirometry Guidelines for General Practice
- All patient education booklets

Also available on website
- Demonstration of Inhaler Technique, How to use Spacer Devices and Peak Flow Meters.

Visit the GINA website at www.ginasthma.org