

Quality in Practice Committee



ASTHMA



Asthma Control in General Practice

*Adapted from the GINA
Global Strategy for Asthma
Management and Prevention*

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*Authors on behalf of the National Asthma Programme:
Dr Jean Holohan, Dr Pat Manning, Dr Dermot Nolan*

DESCRIPTION OF LEVELS OF EVIDENCE	
Evidence Category	Sources of Evidence
A	Randomised controlled trials (RCTs). Rich body of data
B	Randomised controlled trials (RCTs). Limited body of data
C	Nonrandomised trials. Observational studies
D	Panel consensus judgement

**Oxford Centre for Evidence-based Medicine levels of evidence (LOE)*

ICGP Quality in Practice Committee Members:

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 Dr Susan McLaughlin
 Dr Grainne Ní Fhighlu,
 Dr Raymond O'Connor,
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 Dr Margaret O'Riordan,
 Dr Ben Parmeter,
 Dr William Ralph,
 Dr Philip Sheeran Purcell

The National Asthma Programme would like to acknowledge the work of Louis Coyne in developing these guidelines.

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Whilst every effort has been made by the Quality in Practice Committee to ensure the accuracy of the information and material contained in this document, errors or omissions may occur in the content.

The guidance represents the view of the ICGP which was arrived at after careful consideration of the evidence available. Whilst we accept that some aspects of the recommendations may be difficult to implement initially due to a lack of facilities or insufficient personnel, we strongly believe that these guidelines represent best practice. Where there are difficulties these should be highlighted locally and elsewhere so that measures are taken to ensure implementation. The guide does not however override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of individual patients in consultation with the patient and/or guardian or carer.

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Introduction

Asthma is a chronic inflammatory condition of the airways characterised by recurrent episodes of wheezing, breathlessness, chest tightness and coughing. Asthma cannot be prevented or cured but the clinical manifestations can be effectively controlled with appropriate treatment. When asthma is controlled, there should be no more than occasional recurrence of symptoms and severe exacerbations should be rare.

Asthma in Ireland is characterised by high disease prevalence, sub-optimal control in the majority of patients, low uptake of objective lung function tests for diagnosis and management, infrequent use of asthma management plans and poor patient education.

Ireland has the fourth highest prevalence of asthma world wide, affecting an estimated 450,000 people. Poor asthma control has significant health, social and economic costs. Patients bear the main burden of disease but the cost to our healthcare system is significant. Recent data shows that acute exacerbations of asthma result in over 5,000 hospital admissions, 20,000 ED attendances and 50,000 out-of-hours visits every year in Ireland. The estimated cost for hospital admissions and ED visits is in excess of €18 million annually.

At least one person dies from asthma every week in Ireland.

The Global Initiative for Asthma (GINA) has a primary goal to produce recommendations for the management of asthma based on the best scientific information available. This revised guideline is based on the 2011 update of the Global Strategy for Asthma Management & Prevention and incorporates all the clinically relevant updates since the first edition of 'Asthma Control in General Practice' in 2008. The guideline provides recommendations for the diagnosis and management of asthma in patients aged 5 years and older, in the primary care setting and is a core component of the National Asthma Programme.

The scope of the National Asthma Programme is to ensure the management of asthma is based on current international evidence-based care in all care settings including primary care. The aim of the Programme is to reduce morbidity and mortality associated with asthma in Ireland and to improve the quality of life for all patients with asthma.

The purpose of this document is to assist the healthcare professional to improve diagnostic accuracy; assess, treat and monitor asthma; develop an asthma management plan for individual patients; optimise asthma control; and to manage exacerbations in line with approved protocols. The wide spread implementation of the tools outlined in the document will be a significant factor in achieving this.

Dr Pat Manning, Dr Jean Holohan and Dr Dermot Nolan

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 and increase the probability of a diagnosis of asthma as does the improvement of symptoms after appropriate treatment. The history is extremely important as asthma symptoms are variable and intermittent, and investigation may be completely normal.

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

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 lung function (spirometry or 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 (e.g. after 200–400µg salbutamol 2–4 puffs) 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 (PEF)

PEF measurements can be an important aid in diagnosis and monitoring of asthma but 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.

Coding

It is recommended that every patient is coded for asthma once a diagnosis has been confirmed. Asthma patients are coded under ICD-10 as J45, and ICPC as R96.

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.

A useful method for confirming diagnosis of asthma in children 5 years and younger is a trial of treatment with short-acting bronchodilators and inhaled glucocorticosteroids. Marked clinical improvement during the treatment and deterioration when treatment is stopped supports a diagnosis of asthma.

For full information and advice on asthma in this population please refer to the **GINA Strategy for the Diagnosis and Management of Asthma in Children 5 Years and Younger** www.ginasthma.org.

Exercise Induced Bronchoconstriction (EIB)

Physical activity is an important cause of asthma symptoms for most patients, and for some it is the only cause. EIB typically develops 5–10 minutes after completing exercise (it rarely occurs during exercise). Patients experience typical asthma symptoms, or sometimes a troublesome cough, which resolve spontaneously within 30–45 minutes. Some forms of exercise, such as running, are more potent triggers. EIB may occur in any climatic condition, but is more common when the patient is breathing dry, cold air and less common in hot, humid climates

Rapid improvement of post-exertion symptoms after inhaled β_2 -agonists use, or their prevention by pre-treatment with inhaled β_2 -agonists before exercise, supports a diagnosis of asthma. Some children with asthma present only with exercise induced symptoms. In this group, or where there is doubt about the diagnosis, exercise testing is helpful. An 8-minute running protocol is easily performed in clinical practice and can establish a firm diagnosis of asthma.

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 older 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 commenced
- 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.

DIFFERENTIATION BETWEEN COPD AND ASTHMA*	
Diagnosis	Suggestive features
Asthma	Onset early in life (often childhood) <ul style="list-style-type: none"> • Symptoms vary widely from day to day • Symptoms worsen at night or morning • Allergy, rhinitis and/or eczema present • Family history of asthma
COPD	Onset in mid-life <ul style="list-style-type: none"> • Symptoms slowly progressive • History of tobacco use or exposure to other types of smoke

*Taken from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) Guidelines

Asthma management

Goals of long-term management

- Achieve and maintain control of symptoms
- Maintain normal activity levels, including exercise
- Maintain pulmonary function (FEV₁ or 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 and children (**Evidence A**).

Essential features to achieve guided self-management in asthma:

- 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, National Asthma Programme approved 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”
- Potential side effects of medication
- Use of inhaler devices (observe patient technique at every 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

The patient then requires:

- A written asthma management plan
- Regular supervision and revision of their asthma management plan and medication

Personal Written Asthma Management Plans

Personal Written Asthma Management Plans help individuals with asthma make changes to their treatment in response to changes in their level of asthma control, as indicated by symptoms and/or peak expiratory flow in accordance with written pre-determined guidelines.

PEF measurements should preferably be compared to the patient’s own personal best measurements using his/her own peak flow meter. The personal best measurement is usually obtained when the patient is asymptomatic or on full treatment and serves as a reference value for monitoring the effects of change in treatment.

Figure 1. National Asthma Programme (NAP) approved Written Asthma Management Plan

GREEN ZONE: ASTHMA UNDER CONTROL	Peak Flow between 80–100% of Personal Best	YOUR REGULAR TREATMENT. Each day take: 1. Reliever _____ 2. Controller _____ 3. _____ 4. _____ Before Exercise take: _____
<ul style="list-style-type: none"> • Daytime symptoms less than twice/week • No limitation of exercise • No waking at night due to symptoms • Reliever medication used less than twice per week • Peak flow between _____ and _____ 		
BLUE ZONE: ASTHMA GETTING WORSE	Peak Flow between 60–80% of Personal Best	<p>If you answered ‘yes’ to 3 or more of these questions, your asthma is uncontrolled and you may need to step up your treatment.</p> <p>Step up your treatment as follows:</p> <p>1. Increase your reliever to _____</p> <p>2. Take _____</p> <p>The need for repeated doses over more than 1 or 2 days signals the need for a review by your doctor.</p> <p>Use a spacer device if possible for maximum benefit</p>
<ul style="list-style-type: none"> • Daytime symptoms more than twice/week • Getting chesty cough? • Waking at night with cough or wheeze? • New or increased daytime cough or wheeze? • Symptoms after activity or exercise? _____ • Using reliever meds more than twice per week? • Peak flow between _____ and _____ 		
ORANGE ZONE: ASTHMA BECOMING SEVERE	Peak Flow between 40–60% of Personal Best	<p>Call your doctor/clinic: Phone No. _____ and get immediate advice</p> <p>Take the following medication.</p> <p>1. Increase your reliever use to _____</p> <p>2. Additional instructions _____</p> <p>3. Take _____ mg of _____ (oral steroid) if prescribed</p> <p>Out of hours contact _____</p> <p>Use a spacer device if possible for maximum benefit</p>
<ul style="list-style-type: none"> • Symptoms becoming more severe • Becoming breathless at rest • Chest tightness • Reliever medication has poor or short lived effect • Peak flow between _____ and _____ 		
RED ZONE: EMERGENCY	Peak Flow is less than 40% of Personal Best	<p>Get medical help immediately.</p> <p>Go to _____ Phone: _____</p> <p>Out of hours: _____</p> <p>Take 2 to 4 puffs of your reliever inhaler</p> <p>Take _____ mg of _____ (oral steroid) if prescribed</p> <p>Continue to take 2 puffs of reliever every minute until symptoms improve or help arrives. Use a spacer device if possible for maximum benefit</p>
<ul style="list-style-type: none"> • Shortness of breath • Can only speak in short sentences • Trouble walking • Lips are blue • Short lived response to reliever • Peak flow is less than _____ 		

Available for download from www.asthmasociety.ie, www.icgp.ie and www.hse.ie

Asthma management plans are a vital part of patient self management, as introduction of these plans have been shown to significantly reduce acute exacerbations. The utilisation of these plans is low in Ireland and the authors recommend that more attention should be given to this aspect of education.

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, allergen reduction may be helpful in a cohort of patients who notice a deterioration in their asthma symptoms upon exposure to certain allergens. Total avoidance of 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. Smoking cessation support services should be provided for all patients.

Indoor allergens

- House dust mites: live and thrive in many sites throughout the house, are difficult to reduce and impossible to eradicate. For patients with a proven allergy to house dust mite, comprehensive measures may play a role in alleviating asthma symptoms. For more information see www.asthmasociety.ie and the Asthma and Allergic Rhinitis booklet from the Asthma Society of Ireland.
- Furred animals: complete avoidance of pet allergens is impossible as the allergens are ubiquitous and found in many environments outside the home. Removal of such animals from the home is encouraged, but it can be months before allergen levels decrease.
- Fungi: fungal exposure can exacerbate asthma, spores can be reduced by removing/cleaning mould-laden objects. Air conditioning and sealing of windows have been associated with increases in fungal and house dust mite allergens.

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. 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). When food allergy is demonstrated, the patient should be referred to a specialist in that area.

Obesity

Although asthma is not more often diagnosed in obese compared to non-obese patients, it is particularly important to confirm the diagnosis by objective measures of variable airway obstruction or bronchial hyper-responsiveness, as respiratory symptoms associated with obesity may mimic asthma. Weight loss in the obese patient improves asthma control, lung function and reduces medication needs and should be included in the treatment plan.

Asthma is more difficult to control in the obese patient. There is not sufficient evidence to suggest that the management of asthma in the obese should be different than in patients with normal weight. However, there seems to be a reduced response to inhaled glucocorticosteroids in the obese patient, and although this seems to be less evident with leukotriene antagonists, inhaled glucocorticosteroids are the mainstays of asthma treatment in this population.

Drugs

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. 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.

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. **Please see current recommendations from the National Immunization Advisory Committee and HSE websites, www.rcpi.ie and www.hse.ie**

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.
- Hormones: premenstrual and menstrual exacerbations are well recognised. Asthma may improve, worsen or remain unchanged during pregnancy.
- Emotional Stress: can lead to asthma exacerbations in adults and children however it is important to note that asthma is not a psychological disorder.

Component 3: Assess, Treat and Monitor Asthma

Figure 2. Assessing the level of asthma control

A. ASSESSMENT OF CURRENT CLINICAL CONTROL (PREFERABLY OVER 4 WEEKS)			
CHARACTERISTIC	CONTROLLED (All of the following)	PARTLY CONTROLLED (Any measure present)	UNCONTROLLED
Daytime symptoms	None (twice or less/week)	More than twice/week	Three or more features of partly controlled asthma*†
Limitations of activities	None	Any	
Nocturnal symptoms/awakening	None	Any	
Need for reliever/rescue treatment	None (twice or less/week)	More than twice/week	
Lung function (PEF or FEV1)‡	Normal	<80% predicted OR PERSONAL BEST (if known)	
Exacerbations	None	One or more/year*	One in any week‡

B. ASSESSMENT OF FUTURE RISK (RISK OF EXACERBATIONS, INSTABILITY, RAPID DECLINE IN LUNG FUNCTION, SIDE EFFECTS)	
<p>Features that are associated with increased risk of adverse events in the future include:</p> <p>Poor clinical control, frequent exacerbations in the past year*, ever admission to critical care for asthma, low FEV1, exposure to cigarette smoke, high dose medications.</p> <p>* Any exacerbation should prompt review of maintenance treatment to ensure that it is adequate</p> <p>† By definition, an exacerbation in any week makes that an uncontrolled asthma week</p> <p>‡ Without administration of bronchodilator, lung function is not a reliable test for children 5 years and younger</p>	<p>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.</p> <p>The Asthma Control Test (ACT) is a useful tool for patients to check their level of control at home, for further information see www.asthmacontroltest.com and www.asthmasociety.ie.</p>

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 five 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). Uncontrolled asthma may progress to the point of an exacerbation and immediate steps described in Component 4 should be taken to regain control.

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 following 5-step scheme 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.

At each treatment step, a reliever medication should be provided for quick relief of symptoms. However, regular use of reliever medication is one of the elements defining uncontrolled asthma, and indicates that controller treatment should be increased. Thus, reducing or eliminating the need for reliever treatment is both an important goal and measure of success of treatment. See below for a quick calculation of reliever use.

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

Step 1: As-needed reliever medication

As-needed reliever medication only 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 waking

For the majority of patients a rapid-acting inhaled β_2 -agonist is the recommended reliever treatment (**Evidence A**). An inhaled anticholinergic, short-acting oral β_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: As-needed reliever medication plus a single controller

Step 2 is the initial treatment for most treatment-naïve patients with persistent asthma symptoms. All newly diagnosed patients should be reviewed within 2–4 weeks after treatment initiation.

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 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: As-needed reliever medication plus one or two controllers

The recommended option for children older than 6, adolescents and adults is to combine a low dose of ICS with an inhaled long-acting β_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 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 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: As-needed 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 β_2 -agonist. However, in most patients, the increase from a medium- to a high-dose ICS provides relatively little additional benefit (**Evidence A**). 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 β_2 -agonist and/or a third controller (e.g. leukotriene modifiers or sustained release theophylline **Evidence B**).

At medium and high doses, twice-daily dosing is necessary for most but not all ICS (**Evidence A**). With budesonide, efficacy may be improved with more frequent dosing (four times daily **Evidence B**).

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 and may require higher doses of ICS. There is no evidence to support continuing these high doses of ICS beyond 6 months. It is uncommon that patients are completely resistant to glucocorticosteroids.

Step 5: As-needed reliever medication plus additional controller options

Addition of oral glucocorticosteroids to other controller medications may be effective (**Evidence D**) but is associated with severe side effects (**Evidence A**) 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 (**Evidence A**).

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. Patients should be asked to demonstrate their inhaler technique at every visit, with correction and re-checking if it is inadequate. Healthcare professionals should assess asthma control at every visit. There are inhaler technique videos on the Asthma Society of Ireland website www.asthmasociety.ie

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 (return of symptoms) 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

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 (**Evidence B**).
- Where control is achieved with low-dose ICS alone, in most patients treatment may be switched to once-daily dosing (**Evidence B**).
- When control is achieved with ICS and long-acting β_2 -agonist the preferred approach is to begin by reducing the dose of ICS by approx. 50% while continuing the long-acting β_2 -agonist (**Evidence B**). If control is maintained, further reductions in ICS should be attempted until a low dose is reached, when the long-acting β_2 -agonist may be stopped (**Evidence B**).
- 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 B**).

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. Treatment options are:

In patients considered to have difficult-to-treat asthma (uncontrolled at step 4), consider the following:

- Confirm diagnosis of asthma
- Investigate and confirm compliance with treatment; review inhaler technique (**incorrect or inadequate use of inhalers and medication remains the most common reason for failure to achieve control**)
- Consider smoking, current or past
- Investigate comorbidities (chronic sinusitis, gastroesophageal reflux, and obesity/obstructive sleep apnoea)

Rapid-Onset, Short-Acting Or Long-Acting β_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

Doubling the dose of ICS may be effective if instigated early. 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 (**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. A short course of oral steroids may be more convenient for patients, is well tolerated and can be more cost effective.

Combination of ICS and Rapid and Long-Acting β_2 - Agonist

Combination of ICS and rapid and long-acting β_2 -agonist (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.

For children (6–17 years) who have uncontrolled asthma despite the use of low dose ICS, step-up therapy with long acting β_2 -agonist bronchodilator was significantly more likely to provide the best response, then either step up with ICS or leukotriene receptor agonist. However, many children had a best response to ICS or leukotriene receptor agonist step-up therapy, highlighting the need to regularly monitor and appropriately adjust each child's asthma therapy.

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 and leukotriene modifiers can be helpful in aspirin-sensitive patients.

ESTIMATED EQUIPOTENT DAILY DOSES OF INHALED GLUCOCORTICOSTEROIDS FOR ADULTS			
Drug	Low Daily Dose (µg): Up to...	Medium Daily Dose (µg): Up to...	High Daily Dose (µg): Up to...
Beclomethasone dipropionate - HFA	200	500	1000
Budesonide	400	800	1600
Ciclesonide	160	320	1280
Fluticasone propionate	250	500	1000
Mometasone furoate	200	400	800

• The doses above are guidelines only and may vary with delivery device. Check manufacturers recommendations.
 • The principle is 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.
 Most of the benefit from inhaled steroids is achieved in adults at relatively low doses i.e. equivalent to 400µg of budesonide but there is marked individual variation and many patients will require higher doses to achieve full therapeutic benefit.

Figure 3. Management approach based on control

MANAGEMENT APPROACH BASED ON CONTROL

For Children Older Than 5 Years, Adolescents and Adults

Level of control		Treatment Action
Controlled Partly	Step up > < Step down	Maintain and find lowest controlling step
Controlled		Consider stepping up to gain control
Uncontrolled		Step up until controlled
Exacerbation		Treat as exacerbation

- Asthma education
- Environmental control
- If step-up is being considered for poor symptom control, check:
 - Inhaler technique
 - Medication compliance
 - Confirm symptoms are due to asthma



Step 1	Step 2	Step 3	Step 4	Step 5
As needed rapid-acting β ₂ -agonist	As needed rapid-acting β ₂ -agonist			
CONTROLLER OPTIONS	SELECT ONE	SELECT ONE	TO STEP 3 TREATMENT SELECT ONE OR MORE	TO STEP 4 TREATMENT ADD EITHER
	Low-dose inhaled ICS	Low-dose ICS plus long-acting β ₂ -agonist	Medium- or high-dose ICS plus long-acting β ₂ -agonist	Oral glucocorticosteroid (lowest dose)
	Leukotriene modifier	Medium- or high-dose Low-dose ICS plus leukotriene modifier Low-dose ICS plus sustained release theophylline	Leukotriene modifier Sustained release theophylline	Anti-IgE treatment

LABAs should always be used in association with inhaled glucocorticosteroid

Component 4: Manage Asthma Exacerbations

Assessment of Exacerbations

- 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 waking and increased use of short-acting β_2 -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 ED visit or hospitalisation in the past year
 - current use or have recently stopped oral corticosteroids.
 - those not currently using ICS
 - an over dependence on rapid-acting β_2 -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 asthma medications and or an asthma management 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 β_2 -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 β_2 -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 nebuliser. This route of delivery is the most cost effective, provided patients are able to use an MDI.

Response to treatment may take time and patients should be closely monitored using clinical as well as objective measurements. The increased treatment should continue until measurements of lung function (PEF or FEV₁) return to their previous best (ideally) or plateau, at which time a decision to admit or discharge can be made based upon these values. Patients who can be safely discharged will have responded within the first two hours, at which time decisions regarding patient disposition can be made.

MANAGEMENT OF ACUTE ADULT ASTHMA IN GENERAL PRACTICE PROTOCOL

Admit to hospital if any:

- Life threatening feature
- Features of acute severe asthma present after initial assessment
- Previous near fatal asthma

Lower threshold for admission if afternoon or evening attack, recent nocturnal symptoms or hospital admission, previous severe attacks, patient unable to assess own condition, or concern over social circumstances

Assess and Record:

- Peak expiratory flow
- Symptoms and response to self treatment
- Heart, respiratory rates and BP
- Oxygen Saturation (by pulse oximetry, if available)

Caution: Patients with severe or life threatening attacks may not be distressed and may not have all the abnormalities listed below. The presence of any should alert the doctor.

Regard each emergency asthma consultation as for acute life threatening/severe asthma until it is shown otherwise

Life Threatening Asthma	Acute Severe Asthma	Moderate Asthma	Mild Asthma
Initial Assessment			
PEF < 33% Best or predicted	PEF 33–50% best or predicted	PEF 50–75% best or predicted	PEF >75% best or predicted
Further Assessment			
<ul style="list-style-type: none"> • SpO₂ <92% • Silent chest, cyanosis, poor respiratory effort • Bradycardia, arrhythmia, hypotension • Exhaustion, confusion, coma 	<ul style="list-style-type: none"> • PEF <50% (severe) • Respiration >25 breaths/min • Pulse > 110 beats/min • Cannot complete sentence in one breath 	<ul style="list-style-type: none"> • Talks in phrases • RR <25 breaths/min • PR <110 beats/min • Prefer to sit • Loud wheeze 	<ul style="list-style-type: none"> • Speech normal • RR <20 breaths/min • PR <100 beats/min • Can lie down • Mild-mod wheeze
Management			
Arrange immediate ED referral	Consider admission	Treat at home or in the surgery ASSESS RESPONSE TO TREATMENT	
Treatment			
<ul style="list-style-type: none"> • Oxygen 40–60% or higher if available • prednisolone 40–50mg or IV hydrocortisone 100mg immediately • High dose β₂ bronchodilator and ipratropium: <ul style="list-style-type: none"> - Ideally via oxygen driven nebuliser (salbutamol 5mg or terbutaline 10mg) and ipratropium 0.5mg - OR via spacer (up to 12 puffs [given one at a time and inhaled separately]. Assess response in 10–20 mins and repeat as necessary (3 doses in total) 	Oxygen 40–60% if available Maximise the dose of β ₂ bronchodilator: <ul style="list-style-type: none"> • via nebuliser (Ideally oxygen driven) salbutamol 5mg or terbutaline 10mg • OR via spacer up to 12 puffs [given one at a time and inhaled separately] Assess reponse in 10–20 mins and repeat as necessary (3 doses in total). If PEF >50–75% predicted/best • prednisolone 40–50mg or IV hydrocortisone 100mg If no response in acute severe asthma: ADMIT If good response to first nebulised treatment (symptoms improved, respiration and pulse rate settling and PEF >50%) continue step up usual treatment and continue prednisolone	Maximise the dose of β ₂ bronchodilator: <ul style="list-style-type: none"> • via spacer (up to 12 puffs [given one at a time and inhaled separately] Assess response in 10–20 mins and repeat as necessary (3 doses in total) • or via oxygen driven nebuliser (salbutamol 5mg or terbutaline 10mg) PEF >50–75% predicted/best: <ul style="list-style-type: none"> • prednisolone 40–50mg or IV hydrocortisone 100mg If good response to first nebulised treatment (symptoms improved, respiration and pulse rate settling and PEF >75%) continue step up usual treatment and continue prednisolone	<ul style="list-style-type: none"> • Give up to 12 puffs of regular MDI bronchodilator via spacer • Prescribe inhaled steroid • Follow-up treatment as per GINA guidelines

If admitting the patient to hospital:

- Stay with patient until ambulance arrives
- Send written assessment and referral details to hospital
- Give high dose β₂ bronchodilator via oxygen driven nebuliser in ambulance

Post Discharge

- GP review within 2 working days
- Address potential preventable contributors to admission
- Ensure referral to Asthma/ Respiratory Service for follow up if patient uncontrolled at step 3 (ref:GINA)

- In all patients who received nebulised β₂ agonists consider an extended observation period prior to discharge home
- If PEF <50% predicted/best on presentation, prescribe prednisolone 40mg/day for 5 days. Ensure all patients have a treatment supply
- In all patients ensure prescription of inhaled steroid and β₂ agonist as a minimum
- Written Asthma Management Plan with monitoring of symptoms and PEF
- Check Inhaler and peak flow meter technique
- Modify treatment according to guidelines
- Follow up within 48 hours for Moderate and within 2 weeks for mild

MANAGEMENT OF ACUTE ASTHMA IN CHILDREN IN GENERAL PRACTICE

AGED 2–5 YEARS

ASSESS ASTHMA SEVERITY

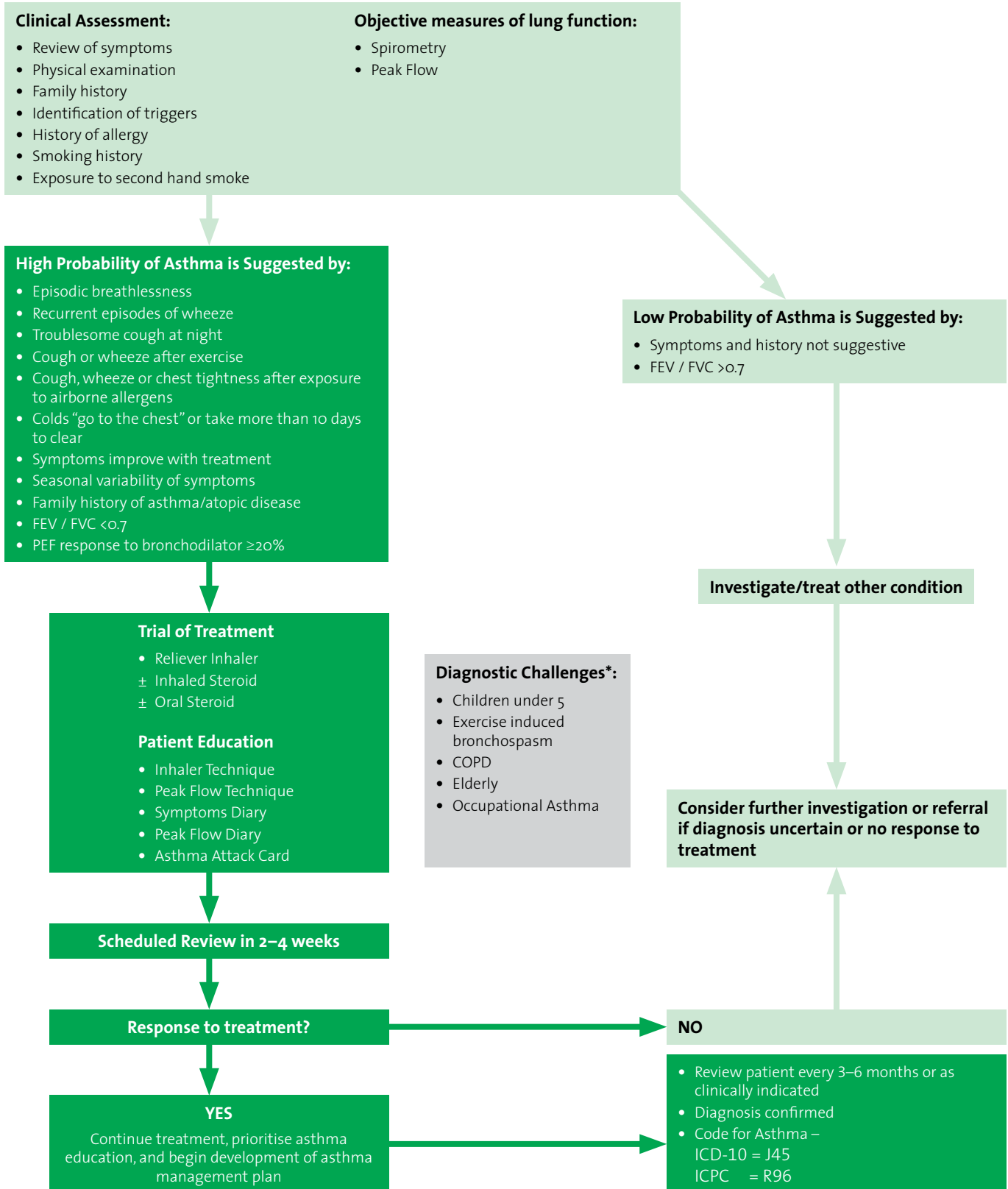
<p>Life threatening asthma</p> <ul style="list-style-type: none"> • SpO₂ <92% • Silent chest • Poor respiratory effort • Agitation • Altered consciousness • Cyanosis 	<p>Severe exacerbation</p> <ul style="list-style-type: none"> • SpO₂ <92% • Too breathless to talk • Heart rate >130/min • Respiratory rate >50/min • Use of accessory neck muscles 	<p>Mild/Moderate exacerbation</p> <ul style="list-style-type: none"> • SpO₂ >92% • Able to talk • Heart rate < 130/min • Respiratory rate <50/min
<ul style="list-style-type: none"> • Oxygen via facemask if available <p>Nebulise:</p> <ul style="list-style-type: none"> • Salbutamol 2.5mg • Or terbutaline 5mg <p>+</p> <ul style="list-style-type: none"> • Ipratropium 0.25mg • Soluble prednisolone 20mg or IV hydrocortisone 50mg 	<ul style="list-style-type: none"> • Oxygen via facemask if available • Up to 6puffs of β₂ agonist via spacer (given one at a time and inhaled separately). Review and repeat if necessary (3 doses in total) or nebulised salbutamol 2.5mg or terbutaline 5mg. • Soluble prednisolone 20mg <p>Assess response to treatment 10–20 minutes after β₂ agonist</p>	<ul style="list-style-type: none"> • β₂ agonist up to 6 puffs via spacer +- facemask. Review and repeat if necessary (3 doses in total). • Consider soluble prednisolone 20mg <p>Assess response to treatment 10–20 minutes after β₂ agonist</p>
<p>REPEAT β₂ AGONIST VIA OXYGEN-DRIVEN NEBULISER WHILST ARRANGING IMMEDIATE HOSPITAL ADMISSION</p>	<p>IF POOR RESPONSE REPEAT β₂ AGONIST AND ARRANGE ADMISSION</p>	<p>IF POOR RESPONSE REPEAT β₂ AGONIST AND ARRANGE ADMISSION</p>
<p>POOR RESPONSE</p> <ul style="list-style-type: none"> • Reassess at 10–20 min intervals • Administer β₂ agonist according to response to treatment while awaiting transfer to hospital • Stay with patient until ambulance arrives • Send written assessment and referral details • Repeat β₂ agonist via oxygen-driven nebuliser in ambulance 		<p>GOOD RESPONSE</p> <ul style="list-style-type: none"> • Continue β₂ agonist via spacer or nebuliser, as needed but not exceeding 4-hourly • If symptoms are not controlled repeat β₂ agonist and refer to hospital • Continue prednisolone for up to 3 days • Arrange follow-up after 48 hours
<p>LOWER THRESHOLD FOR ADMISSION IF:</p> <ul style="list-style-type: none"> • Attack in late afternoon or at night • Recent hospital admission or previous severe attack • Concern over social circumstances or ability to cope at home 		<p>NB: If a patient has signs and symptoms across categories, always treat according to their most severe features</p>

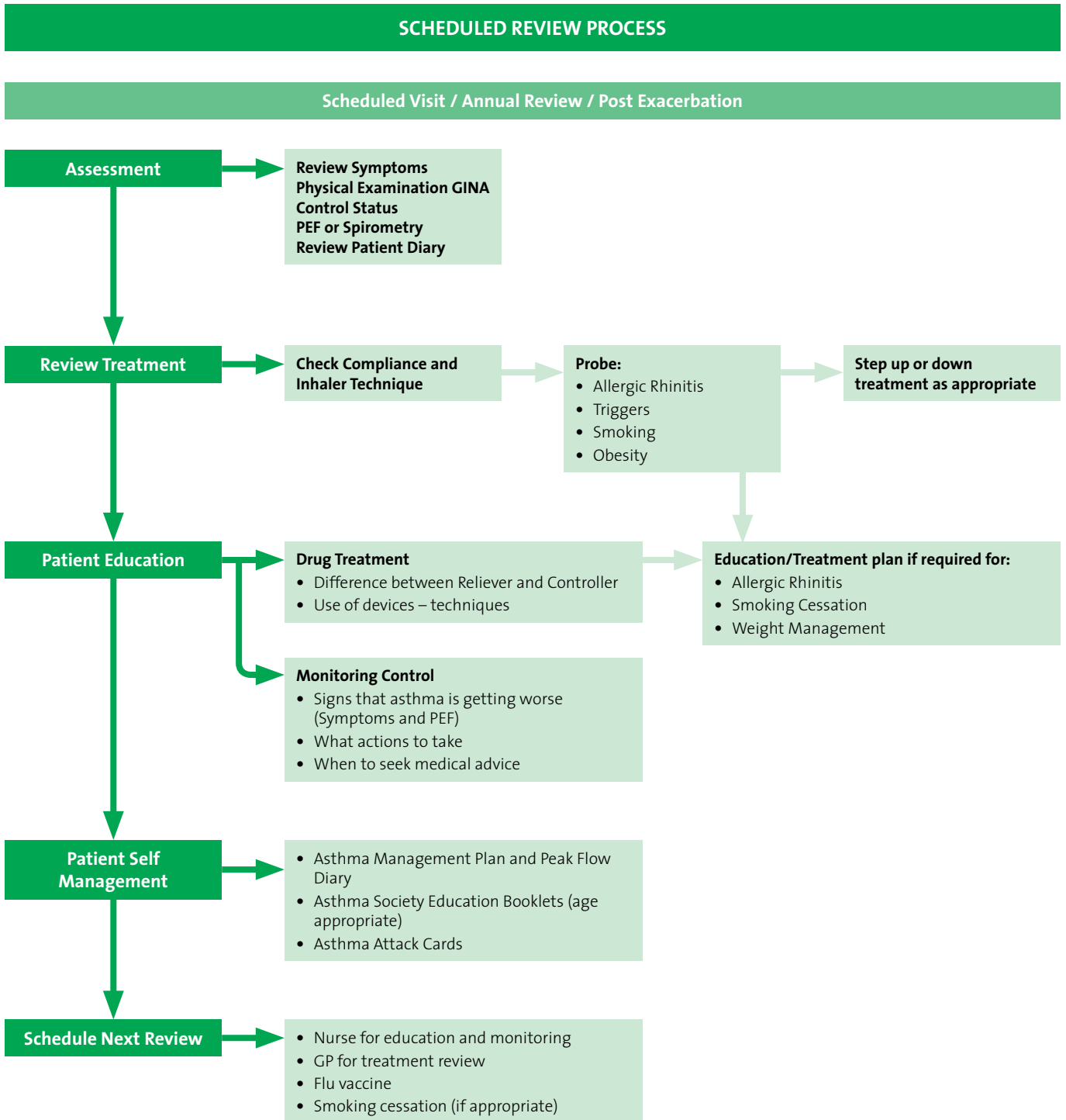
Based on GINA and BTS Guidelines on the Management of Asthma 2008

MANAGEMENT OF ACUTE ASTHMA IN CHILDREN IN GENERAL PRACTICE		
AGED 6–15 YEARS		
ASSESS ASTHMA SEVERITY		
<p>Life threatening asthma</p> <ul style="list-style-type: none"> • SpO₂ <92% • PEF <33% best or predicted • Silent chest • Poor respiratory effort • Agitation • Altered consciousness • Cyanosis 	<p>Severe exacerbation</p> <ul style="list-style-type: none"> • SpO₂ <92% • PEF < 50% best or predicted • Too breathless to talk • Heart rate >120/min • Respiratory rate >30/min • Use of accessory neck muscles 	<p>Mild/Moderate exacerbation</p> <ul style="list-style-type: none"> • SpO₂ ≥ 92% • PEF ≥50% best or predicted • Able to talk • Heart rate ≤120/min • Respiratory rate <30/min
<ul style="list-style-type: none"> • Oxygen via facemask if available <p>Nebulise:</p> <ul style="list-style-type: none"> • Salbutamol 5mg • Or terbutaline 10mg + • Ipratropium 0.25mg • Soluble prednisolone 30–40mg or IV hydrocortisone 100mg 	<ul style="list-style-type: none"> • Oxygen via facemask if available • Up to 12 puffs of β₂ agonist via spacer (given one at a time and inhaled separately). Review and repeat if necessary after 20mins (3 doses in total). or nebulised salbutamol 2.5–5mg or terbutaline 5–10mg. • Soluble prednisolone 30–40mg <p>Assess response to treatment 10–20 minutes after β₂ agonist</p>	<ul style="list-style-type: none"> • β₂ agonist up to 12 puffs via spacer + facemask. Review and repeat if necessary after 20mins (3 doses in total). • Consider soluble prednisolone 30–40mg <p>Assess response to treatment 10–20 minutes after β₂ agonist</p>
<p>REPEAT β₂ AGONIST VIA OXYGEN-DRIVEN NEBULISER WHILST ARRANGING IMMEDIATE HOSPITAL ADMISSION</p>	<p>IF POOR RESPONSE REPEAT β₂ AGONIST AND ARRANGE ADMISSION</p>	<p>IF POOR RESPONSE REPEAT β₂ AGONIST AND ARRANGE ADMISSION</p>
<p>POOR RESPONSE</p> <ul style="list-style-type: none"> • Reassess at 10–20 min intervals • Administer β₂ agonist according to response to treatment while awaiting transfer to hospital • Stay with patient until ambulance arrives • Send written assessment and referral details • Repeat β₂ agonist via oxygen-driven nebuliser in ambulance 	<p>GOOD RESPONSE</p> <ul style="list-style-type: none"> • Continue β₂ agonist via spacer or nebuliser, as needed but not exceeding 4-hourly • If symptoms are not controlled repeat β₂ agonist and refer to hospital • Continue prednisolone for up to 3 days • Arrange follow-up after 48 hours 	
<p>LOWER THRESHOLD FOR ADMISSION IF:</p> <ul style="list-style-type: none"> • Attack in late afternoon or at night • Recent hospital admission or previous severe attack • Concern over social circumstances or ability to cope at home 	<p>NB: If a patient has signs and symptoms across categories, always treat according to their most severe features</p>	

Based on GINA and BTS Guidelines on the Management of Asthma 2008

NEW PATIENT – INITIAL VISIT PROCESS





At Every Consultation with Asthma Patients ask these 3 questions*:

1. Have you had difficulty sleeping because of asthma symptoms including cough?
2. Have you had your usual asthma symptoms during the day (cough, wheeze, chest tightness or breathlessness)?
3. Has your asthma interfered with your usual activities (e.g. housework, work / school etc.)?

*Royal College of Physicians (RCP) 3 questions

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
- Asthma in Pregnancy
- Best Practice Asthma Management Guidelines for Schools in Ireland
- Asthma Management Plan and Peak Flow Diary for Adults
- 'My Asthma Plan' – Children's Asthma Management Plan
- 'Reach your Peak with Asthma'
- Gardening with Asthma and Allergies & Creating an Allergy Friendly Garden
- Asthma Tips for After-School Carers of Children in Ireland
- Videos of Inhaler Technique, How to Use Spacer Devices and Peak Flow Meters and an Asthma Friendly Home

ALL BOOKLETS ARE AVAILABLE FREE OF CHARGE AND CAN BE DOWNLOADED FROM OUR WEBSITE, SEE "PUBLICATIONS"

www.asthmasociety.ie/publications

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
- Videos available on website
- Demonstration of Inhaler Technique, How to use Spacer Devices and Peak Flow Meters.
- National Asthma Management Education Programme available at <http://elearning.asthmasociety.ie>

Visit the GINA website at www.ginasthma.org



ASTHMA

