NATIONAL CLINICAL GUIDELINES

THE DIAGNOSIS & MANAGEMENT OF ASTHMA IN ADULTS

Ministry of Public Health
P.O. Box 42,
Doha, Qatar
Phone: (+974)4 407 0969
Email: clinicalguidelines@moph.gov.qa

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المبادئ الإرشادية السريرية لدولة قطر
NATIONAL CLINICAL GUIDELINES FOR QATAR

وزارة الصحـــــة العامـــــة
Ministry of Public Health
State of Qatar • دولـــة قطـــر

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Version History

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1.0	Final	14th December 2016	Guidelines Team	Final version for publication.
2.0	Updated Version	22nd August 2019	Guidelines Team	Updated Published Version

Citation

Suggested citation style:

Ministry of Public Health Qatar. National Clinical Guideline: The Diagnosis and Management of Asthma in Adults (2019).

Abbreviations

The abbreviations used in this guideline are as follows:

ACQ	Asthma Control Questionnaire
ACT	Asthma Control Test
AIDS	Acquired Immunodeficiency Syndrome
BUD/FOR	Budesonide & Formeterol
CBC	Complete Blood Count
COPD	Chronic Obstructive Pulmonary Disease
FE_{NO}	Fractional Exhaled Nitric Oxide
FEV_1	Forced Expiratory Volume in 1 second
GINA	Global Initiative for Asthma
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IgE	Immunoglobulin E
IPPV	Intermittent positive pressure ventilation
LABA	Long-acting $beta_2$-agonists
NSAIDs	Non-steroidal anti-inflammatory drugs
$PaCO_2$	Partial pressure of carbon dioxide
PaO_2	Partial pressure of oxygen
PCV13	13-valent pneumococcal conjugate vaccine
PPSV23	23-valent pneumococcal polysaccharide vaccine

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PEF	Peak Expiratory Flow rate
pMDI	Pressurised metered dose inhaler
SABA	Short-acting beta$_2$-agonists
SpO_2	Percentage of oxygen saturation
LAMA	Long Acting Muscarinic Antagonist
IL-5	Interleukin 5
SLIT	Sublingual Immunotherapy
HDM	House Dust Mites

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Table of Contents

1 Information About this Guideline

1.1 Objective and Purpose of the Guideline

The purpose of this guideline is to define the appropriate diagnosis and management of asthma in adults. The objective is to reduce inappropriate prescribing and referral of patients presenting to any provider organisation in Qatar. It is intended that the guideline will be used primarily by physicians in primary care and outpatient settings.

1.2 Scope of the Guideline

Diagnosis, assessment and management of acute and chronic asthma, in adults over age 18 years, in primary and secondary care, including:

- Non-pharmacological and pharmacological management.
- Choice of inhaler devices.

Aspects of care not covered in this guideline are:

- Management of asthma in pregnancy.
- Management of asthma in children.

1.3 Editorial Approach

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well-reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising healthcare professionals, subject matter experts and patient representatives, from across Qatar.
- Independent review of the guideline by the National Clinical Guidelines & Pathways Committee, appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

1.4 Sources of Evidence

The professional literature published in the English language has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a clinical editor and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals (i.e. journals that are read and cited most often within their field).
3. Address an aspect of specific importance to the guideline in question.

Where included, the 'goal length of stay' stated within this guideline is supported by and validated through utilisation analysis of various international health insurance databases. The purpose of database analysis is to confirm the reasonability and clinical appropriateness of the goal, as an achievable benchmark for optimal duration of inpatient admission.

Further information about the literature search and appraisal process is included in the appendix.

1.5 Evidence Grading and Recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritativeness of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.

- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.

- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A (RGA):** Evidence demonstrates at least moderate certainty of at least moderate net benefit.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C (RGC):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

1.6 Guideline Development Group Members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the Clinical Governance Group. The GDG members have reviewed and provided feedback on the draft guideline relating to the topic. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

Guideline Development Group Members		
Name	**Title**	**Organisation**
Dr Nisar Cherukattil Abdulla	General Practitioner	Aster DM Healthcare
Dr Abbas Abdallah Al Abbas	Senior Consultant Pulmonologist	Hamad Medical Corp
Dr Amal Alali	Consultant Family Medicine	Primary Health Care Corp
Dr Ebtesam Khalifa Al Jalahma	Consultant Family Medicine	Primary Health Care Corp
Dr Hassan Al-Sawaf	Consultant Pulmonologist	Al Ahli Hospital
Dr Mohd Saeed Desouky	Consultant Internal Medicine	Doha clinic
Dr Maha Hamza	Senior Consultant Pulmonologist	Hamad Medical Corp
Dr Wanis H. Ibrahim	Senior Consultant Internist & Pulmonologist	Hamad Medical Corp
Dr Maanvizhi Kandiah	General Practitioner	Aster DM Healthcare
Dr Nidal Muhanna	Consultant Internal Medicine	Family Medicine Clinic
Dr Tariq Shaikh	Consultant Internal Medicine	Al Ahli Hospital

1.7 National Clinical Guidelines & Pathways Committee Members

The following table lists members of the National Clinical Guidelines & Pathways Committee (NCGPC), appointed by the MOPH. The NCGPC members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

National Clinical Guidelines & Pathways Committee (NCGPC) Members		
Name	**Title**	**Organisation**
Ms Huda Amer Al-Katheeri	Chair of the NCGPC, Director of Strategic Planning & Performance Department	Ministry of Public Health
Shk Dr Mohammed Hamad J. Al Thani	Co-Chair of the NCGPC, Director of Public Health	Ministry of Public Health
Prof Anthony Akobeng	Chair Clinical Practice Guidelines Committee	Sidra Medicine
Dr Maryam Ibrahim Al-Heidous	Registration coordinator, QCHP	Ministry of Public Health
Dr Alshaymaa Mohammed A. M. Al-Motawa	Consultant Family Medicine	Qatar Petroleum
Dr Abi Khalil Charbel	Associate Professor of Medicine Consultant Cardiology	Weill Cornell Medicine-Qatar
Dr Paul Dijkstra	Director of Medical Education	Aspetar
Dr Mohamed Elrishi	Consultant Endocrinology and Internal Medicine	Al Ahli Hospital
Dr Dahlia Mustafa Hassan	Consultant Family Medicine	Primary Health Care Corp
Dr Ghassan Youseph Hommos	Consultant Endocrinology	Al Emadi Hospital
Dr Chris Kenny	Executive Director Clinical and Service Development, Office of the Chief Medical Officer	Hamad Medical Corporation
Dr Egon Toft	VP and Dean of College of Medicine	College of Medicine, Qatar University

1.8 Responsibilities of Healthcare Professionals

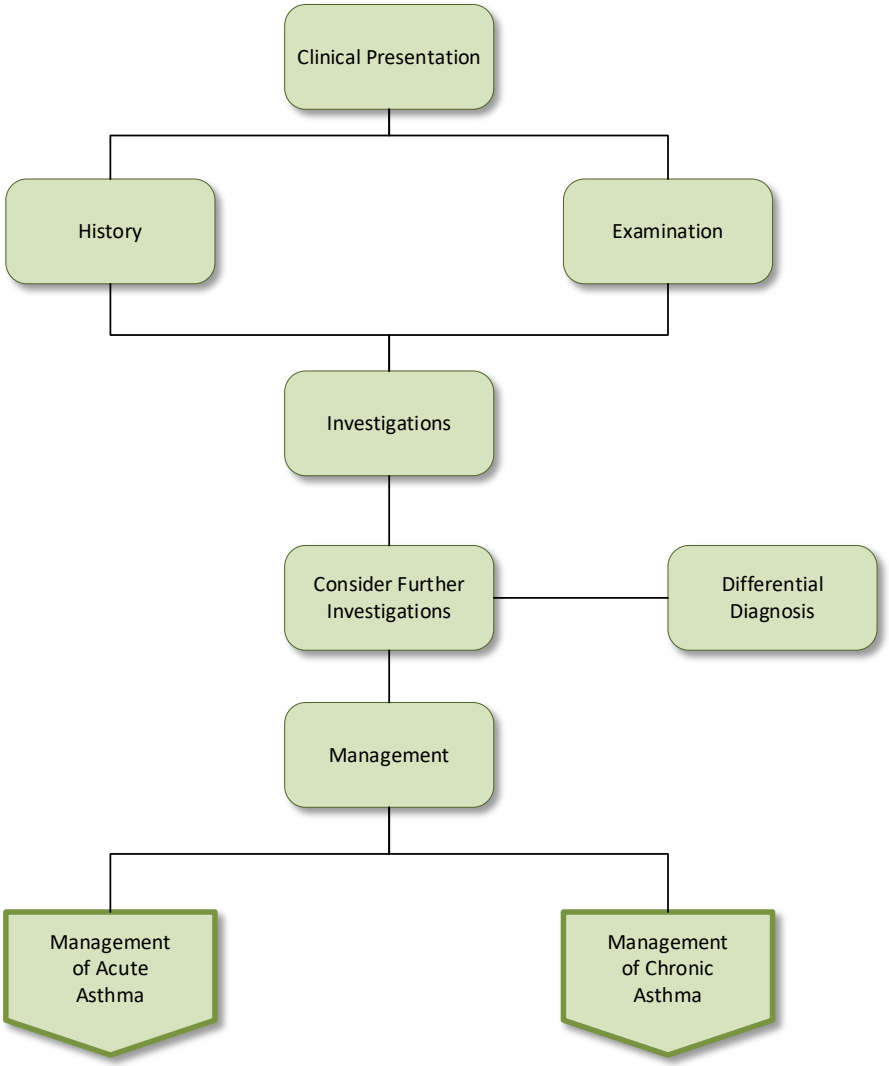
This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

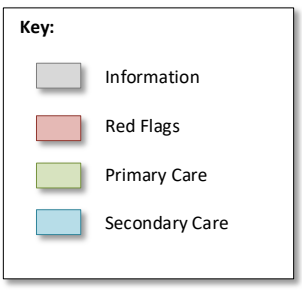
The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or carers and should consider the individual risks and benefits of any intervention that is contemplated in the patient's care.

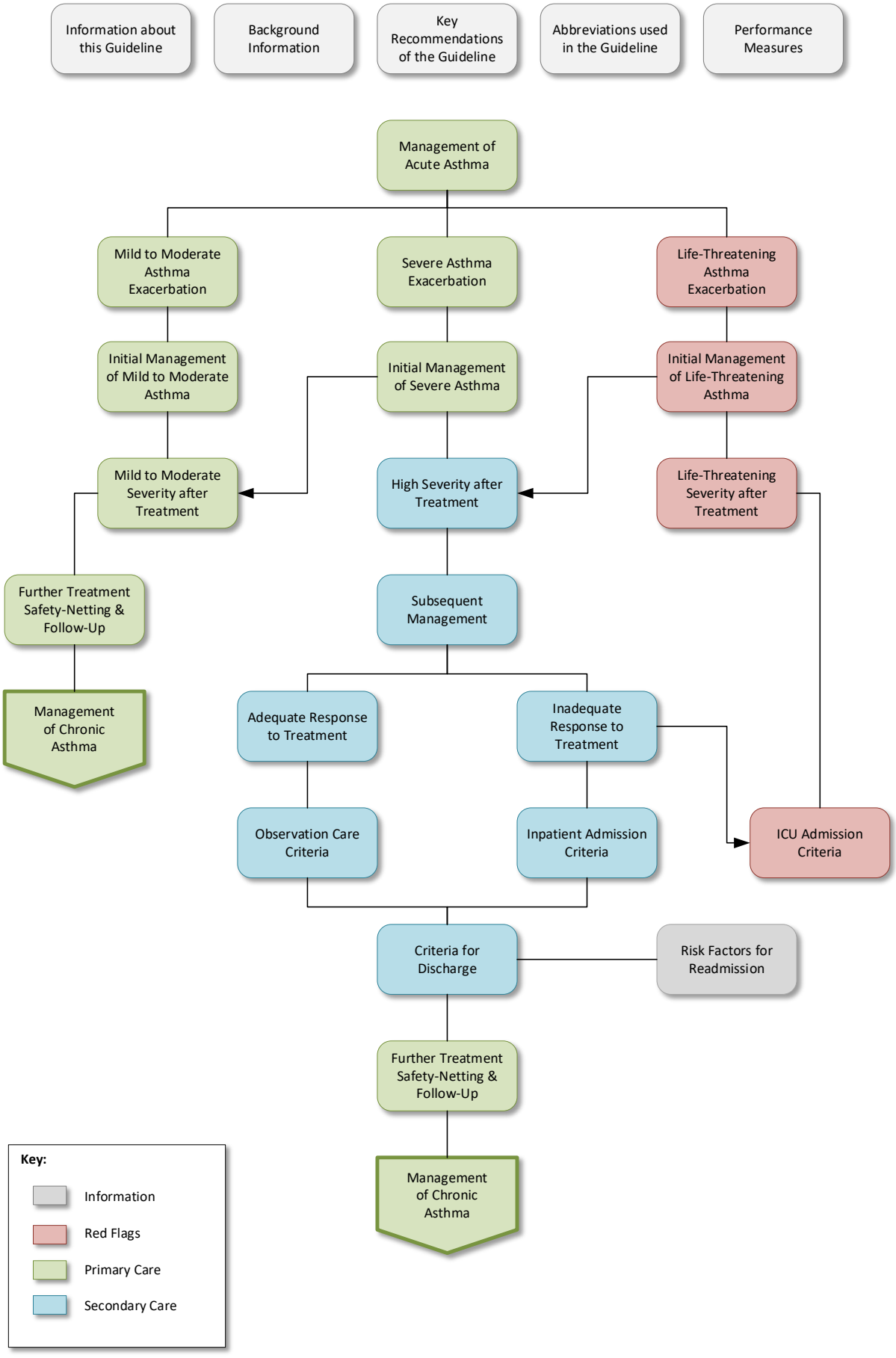
2 Asthma in Adults Pathway

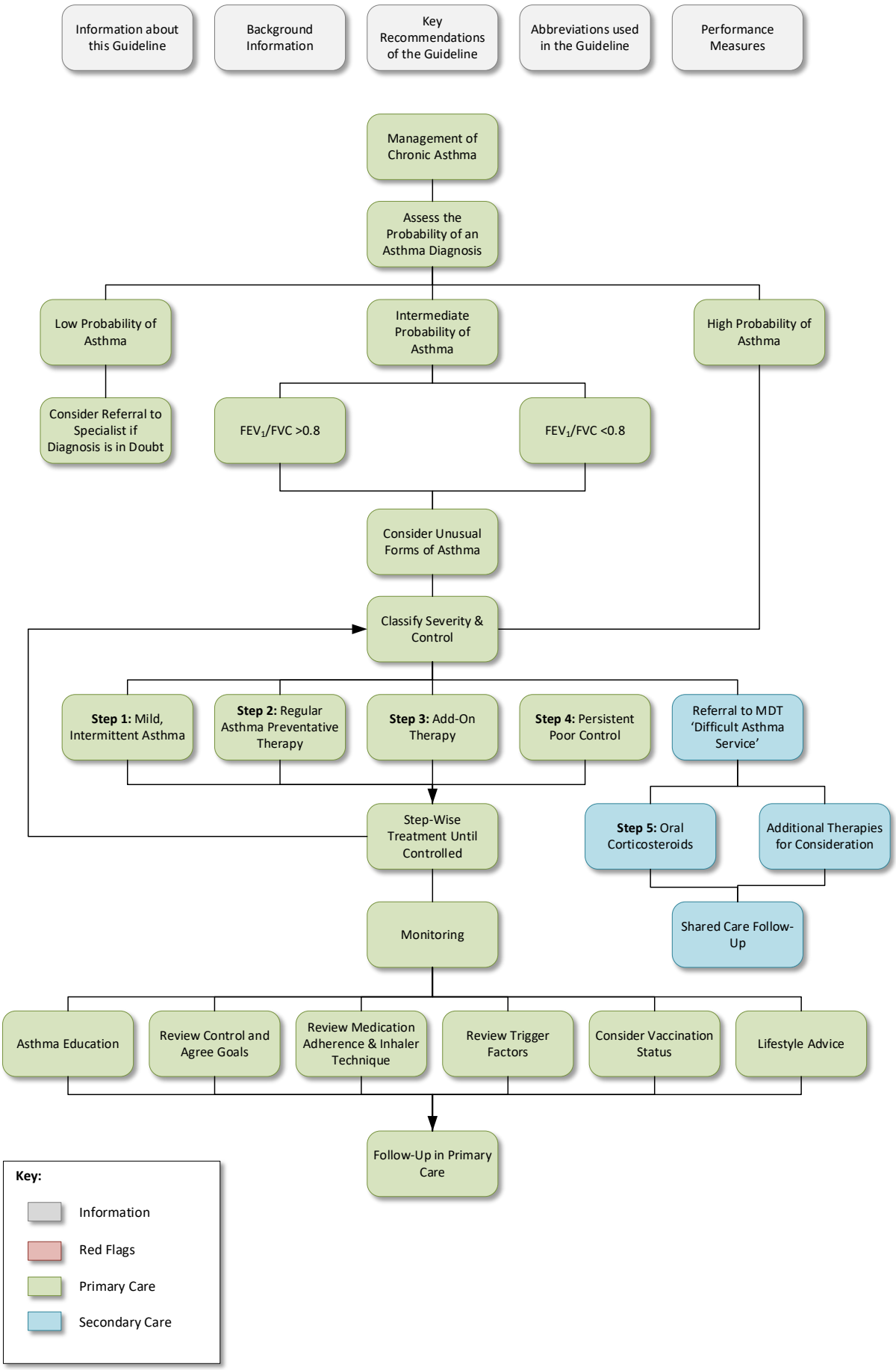
Click on a box below to see the relevant page of the Pathway.

Information about this Guideline | Background Information | Key Recommendations of the Guideline | Abbreviations used in the Guideline | Performance Measures






Information about this Guideline
Background Information
Key Recommendations of the Guideline
Abbreviations used in the Guideline
Performance Measures
Management of Acute Asthma
Mild to Moderate Asthma Exacerbation
Severe Asthma Exacerbation
Life-Threatening Asthma Exacerbation
Initial Management of Mild to Moderate Asthma
Initial Management of Severe Asthma
Initial Management of Life-Threatening Asthma
Mild to Moderate Severity after Treatment
High Severity after Treatment
Life-Threatening Severity after Treatment
Further Treatment Safety-Netting & Follow-Up
Subsequent Management
Management of Chronic Asthma
Adequate Response to Treatment
Inadequate Response to Treatment
Observation Care Criteria
Inpatient Admission Criteria
ICU Admission Criteria
Criteria for Discharge
Risk Factors for Readmission
Further Treatment Safety-Netting & Follow-Up
Management of Chronic Asthma
Key:
Information
Red Flags
Primary Care
Secondary Care


Information about this Guideline
Background Information
Key Recommendations of the Guideline
Abbreviations used in the Guideline
Performance Measures
Management of Chronic Asthma
Assess the Probability of an Asthma Diagnosis
Low Probability of Asthma
Intermediate Probability of Asthma
High Probability of Asthma
Consider Referral to Specialist if Diagnosis is in Doubt
FEV1/FVC >0.8
FEV1/FVC <0.8
Consider Unusual Forms of Asthma
Classify Severity & Control
Step 1: Mild, Intermittent Asthma
Step 2: Regular Asthma Preventative Therapy
Step 3: Add-On Therapy
Step 4: Persistent Poor Control
Referral to MDT 'Difficult Asthma Service'
Step-Wise Treatment Until Controlled
Step 5: Oral Corticosteroids
Additional Therapies for Consideration
Monitoring
Shared Care Follow-Up
Asthma Education
Review Control and Agree Goals
Review Medication Adherence & Inhaler Technique
Review Trigger Factors
Consider Vaccination Status
Lifestyle Advice
Follow-Up in Primary Care
Key:
Information
Red Flags
Primary Care
Secondary Care

3 Key Recommendations of the Guideline

The key recommendations of this guideline are:

Organisation of Care in Qatar:

- Dedicated asthma clinics should be considered in primary health care in Qatar [**R-GDG**].
- Spirometry should be made available to all primary care clinics and all outpatient clinics where asthmatic patients are managed [**R-GDG**].

Investigations:

- Spirometry is the preferred initial test to assess for the presence and severity of airflow obstruction in all patients with a high or intermediate probability of asthma[1–4][**L1, RGA**].
- Peak Expiratory Flow Measurement should only be used if spirometry is unavailable[1,2,4][**L2, RGA**].

Occupational Asthma:

- Consider occupational asthma in all working-age people who experience symptoms of airflow limitation[1,5][**L2, RGA**].
- Do not make a diagnosis on the basis of a compatible history alone, due to implications for future employment [**R-GDG**].
- Refer to a specialist in occupational lung diseases if uncertain about the diagnosis [**R-GDG**].

Acute Asthma:

- Except for mild to moderate exacerbations of asthma, early referral to an Emergency Department is strongly recommended as asthma is a preventable cause of death [**R-GDG**].
- A patient who has had any feature of a life-threatening or near-fatal asthma attack at any time, or any feature of a severe asthma attack persisting after initial treatment, should be admitted to hospital, rather than discharged[1][**L2, RGA**]
- Patients should ideally be managed on an outpatient basis or in an observation care setting. However if inpatient admission is indicated, the optimal length of stay for admission is 1-2 days[6][**L3**].

Chronic Asthma:

- Asthma is best monitored in primary care by routine clinical review on at least an annual basis[1][**L3, RGA**].
- Offer all patients self-management education including a written personalised asthma action plan[1,2,7][**L1, RGA**].
- Theophyllines should be used with caution in patients with co-existing cardiac disease [**R-GDG**].
- Treatment with immunotherapy, biological therapy or bronchial thermoplasty should only be initiated in specialist centres with special expertise in the evaluation and management of patients with severe and difficult asthma [**R-GDG**].

4 Background Information

4.1 Definition

Asthma is defined as a chronic and recurrent, completely or partially reversible airway obstruction; associated with airway inflammation and increased responsiveness of the airways, to a variety of stimuli; in the absence of an alternative explanation[1,2,8–10].

An 'asthma attack', also known as an 'acute exacerbation of asthma' is a term used to describe a rapid onset of worsening asthma symptoms[1,2,8–10].

4.2 Aetiology

Asthma comprises a range of heterogeneous phenotypes that differ in presentation, aetiology and pathophysiology. The fundamental causes of asthma however are not completely understood. The risk factors for each recognized phenotype of asthma include genetic, environmental and host factors. Although a family history of asthma is common, it is neither sufficient nor necessary for the development of asthma[11].

The substantial increases in the incidence of asthma over the past few decades and the geographic variation in both base prevalence rates and the magnitude of the increases, support the thesis that environmental changes play a large role in the current asthma epidemic. Furthermore, environmental triggers may affect asthma differently at different times of a person's life, and the relevant risk factors may change over time[11].

4.3 Prognosis

Although complete remission is possible in adult asthma, remission rates are low and limited to milder cases. Permanent lung function impairment develops in some asthmatic patients, and this risk is increased in smokers[8–10].

Longitudinal studies indicate that severe asthma has a poorer prognosis with regard to both development of permanent lung function impairment and hospitalization and mortality. In particular, patients with previous admissions to intensive care units and those with brittle asthma continue to be at high risk of severe asthma complications. Overall, the risk of death in asthmatic subjects is increased to approximately twice that in other subjects due to an increased risk of death from lung diseases[11].

4.4 Complications

Complications of asthma in adults include[1,2,7–11]:

- Death – asthma is a common cause of death around the world.
- Respiratory complications:
    - Status asthmaticus – acute exacerbation of asthma which remains unresponsive to initial treatment with nebulised bronchodilators.
    - Respiratory failure.
    - Collapsed lobe or lung.
    - Pneumothorax.
    - Pneumonia.

    - Pneumomediastinum.
- Impaired quality of life may result from suboptimal control of asthma – this may include:
    - Impaired sleep.
    - Fatigue, resulting in:
        - Interference with usual activities.
        - Poor performance at work and increased absenteeism.
    - Psychological problems, including stress, anxiety, and depression.

4.5 Risk Factors for Development of Asthma

Risk factors for developing asthma, include[1,10,11]:

- Family history of atopic disease, e.g.:
    - Asthma.
    - Eczema.
    - Allergic rhinitis.
    - Allergic conjunctivitis.
- Co-existence of atopic disease in the patient:
    - Eczema.
    - Allergic rhinitis.
    - Allergic conjunctivitis.
    - Food allergy.
- Female sex for persistence of asthma from childhood to adulthood.
- Bronchiolitis in infancy.
- Passive smoking.

5 Presentation

Asthma in adults typically causes recurrent respiratory symptoms of[1,2,8,9]:

- Wheeze.
- Cough.
- Difficulty breathing.
- Chest tightness.

The two main presentations of asthma in adults are:

- Acute asthma attack (an acute exacerbation of asthma).
- Chronic asthma.

5.1 Presentation of Acute Asthma

An acute asthma attack is characterised by[1,2,8,10]:

- Sudden onset of shortness of breath and wheeze.
- Increased respiratory effort and decreased exercise tolerance.

Factors that increase the risk of developing near-fatal or fatal asthma[1,2,8,10]:

- Previous near-fatal asthma e.g. previous ventilation or respiratory acidosis.
- Previous admission for asthma especially if within the last year.
- Requirement for three or more classes of asthma medication.
- Heavy use of $beta_2$ agonists.
- Repeated attendances at Emergency Department for asthma care especially if in the last year.
- Non-compliance with treatment or monitoring.
- Failure to attend appointments.
- Self-discharge from hospital.
- Psychosis, depression, other psychiatric illnesses or deliberate self-harm.
- Current or recent major tranquiliser use.
- Alcohol or substance misuse.
- Learning difficulties.
- Employment or income problems.
- Social isolation.
- Severe domestic, marital or legal stress.

5.2 Presentation of Chronic Asthma

Typical patterns[1,2,12]:

- Intermittent attacks superimposed on a baseline of good control.
- Chronic symptoms punctuated by intermittent worsening.
- Morning 'dipping', characterised by:
    - Worsening of symptoms and decreased peak flow in the early morning.
    - Improvement as the day progresses.
- Prominent nocturnal cough.

6 History

History taking should be directed to establishing the probability of a diagnosis of asthma and classification of the severity of asthma, according to the pattern of episodic symptoms that the patient reports.

Important points in the history to elicit include[1,7–11,13]:

- Ask about symptoms that are episodic, variable, and typically worse at night, including:
    - Wheeze.
    - Shortness of breath.
    - Chest tightness.
    - Cough.
    - Symptoms that worsen after exposure to recognised triggers, including:
        - Pollen.
        - Dust (house dust mite).
        - Animal allergen.
        - Exercise.
        - Viral infections.
        - Chemicals.
        - Environmental and household tobacco smoke and mould.
        - Recent medication initiation or change, including:
            - Aspirin.
            - Non-steroidal anti-inflammatory drugs (NSAIDs).
            - Beta blocker tablets.
            - Eye drops, e.g. beta blocker, prostaglandins.
        - Seasonal or diurnal variation.
        - Severity of illness and control.
        - Exercise limitation.
        - Sleep disturbance and sleeping conditions.
        - Establish whether there is a personal and/or family history of asthma or other atopic conditions, e.g. eczema, allergic rhinitis.
- Occupation:
    - Elicit information about:
        - Materials with which they work.
        - Whether their symptoms improve regularly when away from work.
    - 1 in 6 cases of new or recurrent asthma is attributable to occupation.
- Pets.
- Carpeting.
- Housing conditions.

7 Examination

Examination in a patient presenting with acute asthma should be directed towards establishing the severity of the exacerbation, according to the degree of respiratory distress that is evident and excluding other possible causes of acute respiratory distress[1,2,7,12,14].

The key point to a successful diagnosis, is a structured clinical assessment where the physician uses a combination of symptoms approach rather than isolating symptoms individually, and by evaluating the episodic nature of the detected symptoms and the evidence and variability of airflow obstruction[2,15–18]

In all patients the following points in the examination should be reviewed[1,2,7,12]:

- Presence of cyanosis.
- Consciousness level.
- Respiratory rate, degree of breathlessness.
- Accessory muscle usage.
- Pulse rate.
- Presence of wheeze (confirmed on auscultation):
    - Inspiratory or expiratory wheeze.
    - A 'silent chest' may be indicative of a life-threatening exacerbation.

Examination of a patient presenting with chronic asthma, should focus on[1,2,7–9,12,13]:

- Establishing the presence of the classical end expiratory wheeze. If the patient is asymptomatic at the time of the presentation, then the examination maybe unremarkable.
- Signs of atopic disease e.g. eczema, allergic rhinitis, allergic conjunctivitis.
- Signs of comorbid conditions e.g. gastro-oesophageal reflux, obesity, chronic rhinosinusitis.
- Signs of poorly-controlled chronic disease.
- Exclusion of other differential diagnoses.

8 Investigations

Spirometry[1–4,12,19]:

- Should be performed by well-trained and experienced operators who are qualified to provide the test in relevant age groups.
- Is the preferred initial test to assess for the presence and severity of airflow obstruction [**L1, RGA**] as it is more adept at identifying airway obstruction than peak expiratory flow (PEF), and the results are less dependent on effort.
- Should be made available to all primary care clinics and all outpatient clinics where asthmatic patients are managed [**R-GDG**].
- A normal spirometry in asymptomatic patients cannot exclude asthma.
- **Reversibility testing:** An increase in FEV_1 of ≥12% from baseline and an absolute increase of 200ml, following inhaled bronchodilator or following a 4 weeks course of inhaled corticosteroids or 2 weeks of oral corticosteroids suggests asthma [**L1**].

Peak Expiratory Flow Measurement (PEF):

- Use PEF only if spirometry is unavailable[1,2,4,12][**L2, RGA**].

Fractional Exhaled Nitric Oxide (FE_{NO}) Testing[1–4,12,14,19,20]:

- A non-invasive marker of airway inflammation in asthma.
- Indicative of eosinophilic asthma and is raised in eosinophilic airway inflammation.

- Recommended as an option for asthma-specialised physicians to help diagnose asthma in adults who are considered to have an intermediate probability of having asthma, in combination with other diagnostic options.
- Further investigation is recommended if FE_{NO} test result is negative, as a negative result does not exclude asthma.

Broncho-Provocation Testing (e.g. methacholine challenge testing)[1,2,13,20][**L1**]:

- Used to assist in the diagnosis of asthma.
- A negative test effectively excludes asthma.

Other investigations may include[1–4,8]:

- Full lung function tests.
- Tests of atopy including CBC for eosinophil count and IgE antibody levels.
- Chest radiograph - consider performing, if the patient presents with severe or life-threatening asthma or atypically, with additional symptoms or signs.
- Arterial blood gas - in a hospital setting.

9 Differential Diagnosis of Chronic Asthma

Differential diagnosis of asthma includes[1,2,8,10]:

- Absence of airflow obstruction:
    - Upper airway cough syndrome (post-nasal drip).
    - Gastro-oesophageal reflux.
    - Rhinitis.
    - Post viral bronchial hyper-reactivity.
    - Heart failure.
    - Hyperventilation and dysfunctional breathing syndromes.
    - Vocal cord dysfunction.
    - Pulmonary fibrosis.
    - Chronic cough syndrome.

- Presence of airflow obstruction[1–4]:
    - Acute bronchitis.
    - COPD.
    - Bronchiectasis – may also be associated with non-obstructive spirometry.
    - Inhaled foreign body.
    - Lung cancer – may also be associated with non-obstructive spirometry.
    - Sarcoidosis – may also be associated with non-obstructive spirometry.
    - Obliterative bronchiolitis.

Rarer differential diagnoses which may cause a failure to respond include[1–4,8,9]:

- Aspiration.
- Interstitial lung disease.
- Pulmonary embolism.
- Churg-Strauss syndrome.

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10 Management of Acute Asthma

A presentation of an acute attack may be classified according to the degree of respiratory distress that is observed[1,2,14,21–23]. Except for mild to moderate exacerbations, early referral to an Emergency Department is strongly recommended as asthma is a preventable cause of death [**R-GDG**].

10.1 Management of Acute Asthma in the Community

The main classifications of an acute exacerbation of asthma and their initial management, are outlined in the table below. If a patient has signs and symptoms across categories, always treat according to their most severe features[1].

<table>
<tr><th></th><th>Lifethreatening</th><th>Severe</th><th>Mild to moderate</th></tr>
<tr><td rowspan="5">Assessment</td><td>• Silent chest, cyanosis or poor respiratory effort.</td><td>• Unable to complete sentences.</td><td>• No features of acute severe asthma.
• Speech normal.</td></tr>
<tr><td>• Exhaustion or altered consciousness.
• Patient may not be distressed.</td><td>• Respiratory rate ≥25 breaths per min.</td><td>• Respiration <25 breaths per min.</td></tr>
<tr><td>• Arrhythmia or hypotension.</td><td>• Pulse ≥110 bpm.</td><td>• Pulse <110 bpm.</td></tr>
<tr><td>• SpO_2 <92% on oxygen.
• PaO_2 <8 kPa (60 mmHg)
• Normal $PaCO_2$ (4.6-6 kPa, 35-45 mmHg).</td><td>• SpO_2 ≥92% on oxygen.</td><td>• SpO_2 ≥92% on air.</td></tr>
<tr><td>• PEF <33% of best or predicted.</td><td>• PEF 33-50% of best or predicted.</td><td>• PEF >50-75% best or predicted.</td></tr>
<tr><td rowspan="5">Initial management in the community</td><td colspan="2">If available, provide the patient with oxygen to maintain SpO_2 level of 94-98%.</td><td>• Oxygen not usually required</td></tr>
<tr><td>• Use nebulised salbutamol 5mg and ipratropium bromide 500mcg.
• Administer nebuliser by piped oxygen (Flow rate >6L/min) or;
• Air-driven nebuliser with supplemental oxygen.</td><td colspan="2">• Use nebulised salbutamol 5mg.
• Administer nebuliser by piped oxygen (Flow rate >6L/min) or;
• Air-driven nebuliser with supplemental oxygen.
Or:
• Salbutamol pMDI via spacer.
• 4-8 puffs initially every 20 minutes for 3 doses, then every 1-4 hours.</td></tr>
<tr><td>• IV methylprednisolone 60-120mg; or
• Give IV hydrocortisone 100mg.</td><td>• Give oral prednisolone 40mg-50mg; or
• IV hydrocortisone 100mg.</td><td>• Give oral prednisolone 40mg-50mg, if more than one nebuliser required.</td></tr>
<tr><td rowspan="2">Transfer to hospital immediately</td><td colspan="2">• Measure and record PEF every 15 mins.
• If no response, refer to hospital.</td></tr>
<tr><td>• If good response, observe to ensure complete recovery or transfer to hospital.</td><td>• If good response to initial management:
• Continue or step-up treatment.
• Continue prednisolone for 5-7 days.</td></tr>
</table>

Table 10.1: Assessment and initial management of acute asthma in the community[1].

View Pathway

10.2 Management of Acute Asthma in the Emergency Department

The management of acute asthma in the Emergency Department setting is outlined in the table below.

	Life threatening	Severe	Mild to moderate
Immediate management	• Consider ventilation. • Discuss with ICU early.	• Consider ventilation if life threatening features develop.	• Monitor for deterioration.
	• Prescribe oxygen to maintain SpO_2 level of 94-98%. • Maintain $Sp0_2$ level at 88-92% in those at risk of hypercapnic respiratory failure.		• Oxygen not usually required
	• Use nebulised salbutamol 5mg and ipratropium bromide 500mcg. • Administer nebuliser by piped oxygen (Flow rate >6L/min) or; Air-driven nebuliser with supplemental oxygen.		• Salbutamol pMDI via spacer. • 4-8 puffs initially every 20 minutes for 3 doses, then every 1-4 hours.
	• IV methylprednisolone 60-120mg; or • Give IV hydrocortisone 100mg.	• Give oral prednisolone 40mg-50mg; or • IV hydrocortisone 100mg.	• Give oral prednisolone 40mg-50mg, if more than one nebuliser has been given.
	• Measure blood gases. • Obtain chest radiograph. • Consider serum potassium and glucose levels.	• Reassess patient after 15mins and record: ○ PEF. ○ Symptoms and response to treatment ○ Heart rate. ○ Respiratory rate. ○ Sp02.	
Further management	• Repeat nebulised salbutamol 5mg and ipratropium bromide 500mcg every 20 minutes. • If no response, consider continuous nebulised salbutamol 5-10mg/hr (only if appropriate nebuliser is available).		• Repeat nebulised salbutamol 5mg if PEF remains <75% of predicted or best.
	• Consider magnesium sulphate 1.2-2g; IV over 20 minutes • Only give after consultation with senior medical staff.		• Consider adding nebulised ipratropium bromide 500mcg, if poor initial response.
	• Correct electrolyte disturbances. • Repeat arterial blood gas. • Admit patient to ward or ICU.	• Consider discharge if PEF >75% of predicted or best; and patient is stable after 60mins of observation. • Continue salbutamol with corticosteroid nebulisers if PEF 50-75% of predicted or best.	• Consider discharge if PEF >75% of predicted or best; and patient is stable after 60mins of observation.

Table 10.2: Management of acute asthma in the Emergency Department[1,2].

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10.3 Further Specialist Management of Acute Asthma

Consider further treatment options if poor response to treatment. Consider the following and discuss with a senior physician[1,2,7,24]:

- Continuous salbutamol nebuliser (monitor serum lactate for toxicity).
- IV magnesium sulphate.
- IV aminophylline.
- IV beta$_2$ agonist.
- Intermittent positive pressure ventilation (IPPV).

NB:

- Nebulised magnesium is not recommended for the treatment of acute asthma[1].
- Antibiotics are not routinely indicated[1].

10.4 Criteria for Discharge

Consider discharging the patient from the Emergency Department if there has been a good response to treatment and the patient is stable after at least 60mins of observation (see *Table 10.2*).

Also consider the following[1,2,25][**L1, RGA**]:

- Consider an extended observation period prior to discharge in all patients who received nebulised beta$_2$ agonists prior to presentation (see *Section 12.1* and *12.2*)
- Provide oral prednisolone daily for at least 5 days or until recovery.
- In all patients ensure treatment supply of inhaled corticosteroid and beta$_2$ agonist.
- Check inhaler technique.
- Arrange primary care physician follow-up within 2 days of discharge.
- Send a fax or electronic discharge letter to the primary care physician within 24 hours of discharge from the Emergency Department.

NB: A patient who has had any feature of a life-threatening or near-fatal asthma attack at any time, or any feature of a severe asthma attack persisting after initial treatment, should be admitted to hospital, rather than discharged[1][**L2, RGA**](see *Section 12.2*).

10.5 Follow-Up of Acute Asthma in Primary Care

Follow-up patients in primary care within 2 days of an acute asthma attack requiring treatment in the community, Emergency Department or hospital setting[1,9][**L2, RGA**].

Follow-up in primary care will include the following[1](see also *Section 11.6*):

- Monitor symptoms and PEF.
- Check inhaler technique.
- Review medication according to chronic asthma guidance (see *Section 11*).
- Address any trigger factors and potentially preventable contributors.
- Give asthma education.
- Discuss a clear plan for what to do if symptoms worsen.
- Provide or review written asthma action plan.
- Assess exposure to tobacco smoke and discuss smoking cessation in smokers.
- Identify the trigger for acute attack and put a management plan for future exposure.

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11 Management of Chronic Asthma

A diagnosis of chronic asthma is primarily clinical and based upon the history and examination findings. An assessment of the probability of an asthma diagnosis should be made in order to determine appropriate next steps in the patient's management[1–3,7,12,14].

11.1 Assessing the Probability of an Asthma Diagnosis

Assessment of the probability of asthma, is based on the findings of both history and examination.

Clinical Features that Increase the Probability of Asthma[1,2]:

- More than one of the following symptoms:
    - Wheeze.
    - Cough.
    - Breathlessness.
    - Chest tightness.
- Particularly if the symptoms above:
    - Are worse at night and in the early morning.
    - Occur in response to, or are worse after:
        - Exercise.
        - Allergen exposure.
        - Cold air.
    - Occur after taking aspirin or beta blockers.
- Personal history of atopic disorder.
- Family history of atopic disorder and/or asthma.
- Widespread wheeze audible on auscultation.
- Otherwise unexplained low FEV_1 or PEF on historical or serial readings.
- Otherwise unexplained peripheral blood eosinophilia.

Clinical Features that Lower the Probability of Asthma[1,2]:

- Prominent dizziness, light-headedness, peripheral tingling.
- Chronic productive cough in the absence of wheeze or breathlessness.
- Repeatedly normal physical examination of chest when symptomatic.
- Voice disturbance.
- Symptoms with colds only.
- Significant smoking history, i.e. more than 20 pack-years.
- Cardiac disease.
- Normal PEF or spirometry when symptomatic:
    - Normal spirometry when not symptomatic does not exclude the diagnosis of asthma.
    - Repeated measurements of lung function are often more informative than a single assessment.

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11.1.1 High Probability of Asthma

A diagnosis of asthma can be made on the basis of clinical history and examination where typical symptoms and signs are present and a trial of treatment can then begin. However due to the significance of the diagnosis and the potential for ongoing treatment over many years, objective confirmation of the diagnosis is recommended[1,2].

Spirometry testing is regarded as a superior test to PEF for confirmation of a suspected diagnosis of asthma as it provides clearer evidence of obstructive lung disease and results are less dependent upon effort[1–3] (see *Section 8*).

Perform spirometry in all patients with a high probability of asthma[2].

- Use reversibility testing in patients with symptoms at the time of assessment (see Section 8).
- If there are no symptoms at the time of assessment, (or if there is an incomplete response to reversibility testing), assess with spirometry after 6-8 weeks of inhaled corticosteroids or after 14 days of oral prednisolone treatment [**R-GDG**].
- If there is no objective evidence of obstruction when the patient is symptomatic, reconsider the diagnosis[1–3].

Consider starting a trial of treatment[1,2][**L2, RGA**]:

- The choice of treatment:
    - Depends on frequency and severity of symptoms.
    - Use either inhaled bronchodilators or corticosteroids.

Consider additional tests to establish the diagnosis if spirometry or a trial of treatment are inconclusive. These may include[1–4,20,26]:

- Other tests of airflow obstruction.
- Tests of airway responsiveness.
- Tests of airway inflammation.

11.1.2 Intermediate Probability of Asthma

In patients with an intermediate probability of asthma, spirometry should be performed. Further investigation then depends on whether airflow obstruction is present[1,2][**L2, RGA**](see *Section 8*).

11.1.2.1 FEV1/FVC <0.75 with Intermediate Probability of Asthma

Undertake further investigation[1–4,20,26]:

- Offer a reversibility test and/or a trial of treatment for a specified period.

If there is a positive reversibility test or an adequate response to a trial of treatment[1,2][**L2, RGA**]:

- Treat as asthma.
- For small improvements in FEV_1 reversibility tests, consider:
    - Continuation of treatment – should be based on objective assessment of symptoms using validated tools.
    - Trials of treatment withdrawal may be helpful if diagnosis is in doubt.

If there is a negative reversibility test or no response to trial of treatment[1,2][**L2, RGA**]:

- Assess adherence and inhaler technique.
- Consider tests for alternative conditions (see *Section 8*).
- Consider referral for further investigations e.g. tests of airway hyper-responsiveness and/or airway inflammation (see *Section 8*).

11.1.2.2 FEV1/FVC >0.75 with Intermediate Probability of Asthma

Arrange further investigations or consider referral to a specialist for further assessment[1,2,20][**L1, RGA**]:

- Assessment of airway responsiveness and/or airway inflammation have high sensitivity, so a normal result indicates that the diagnosis is highly unlikely to be asthma.

11.1.3 Low Probability of Asthma

- If symptoms are thought to be due to an alternative diagnosis, investigate and manage accordingly[1,2].
- If there is no response to treatment of alternative conditions consider referral to a specialist for further assessment of the patient[1,2].

11.2 Consider Occupational Asthma

Consider occupational asthma in all working-age people who experience symptoms of airflow limitation[1,5][**L2, RGA**]:

- Ask the following screening questions and if positive, investigate for occupational asthma[1]:
    - Are you better on days away from work?
    - Are you better on holiday?

Diagnosis of occupational asthma is an iterative process, therefore investigate with minimal delay[1,5]:

- Arrange for the patient to perform serial PEF measurements at least 4 times/day, at and away from work.
- Where a suspected agent is a known sensitising agent, measure specific IgE levels[1,5]:
    - Use skin prick testing or tests for specific IgE for occupational asthma caused by high-molecular agents, but don't use if cause by low-molecular weight agents.
    - If there is doubt, discuss with a specialist in occupational lung disease or allergist.
    - NB: Do not make a diagnosis on the basis of a compatible history alone, due to implications for future employment [**R-GDG**].
    - Refer to a specialist in occupational lung diseases if uncertain about the diagnosis [**R-GDG**].

- If occupational asthma has been diagnosed[1,5]:
    - Advise the person to avoid further exposure to the causative agent.
    - Advise the person that it is important to inform their employer, who can take appropriate protective measures.
    - Seek written informed consent to communicate with the employer and/or their occupational health provider about the diagnosis and protective measures.

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11.3 Premenstrual Asthma in Women

Women with premenstrual asthma experience worsening of symptoms during the premenstrual phase in addition to an increase of the duration of asthma[2,27].
Characteristics of patients:

- Older
- High BMI
- Dysmenorrhea
- Shorter menstrual cycles and longer periods of bleeding
- Worse premenstrual syndrome

This group of patients follow the same management strategies as other patients but can also benefit from the use of oral contraceptives and/or LTRA [2,27]**[L1, RGB]**.

11.4 Consider Exercise-Induced Asthma

For most patients, exercise induced asthma is an expression of poorly controlled asthma and regular treatment including inhaled corticosteroids should be considered[1,2,7].

Immediately prior to exercise, inhaled short-acting beta$_2$-agonists are the drug of choice[1,2,7]. Treatment with relievers such as short-acting beta$_2$-agonists (SABAs) or anticholinergics, administered 10-15 minutes before exercise is the most preferable method of preventing exercise-induced bronchoconstriction.

If exercise is a specific problem in patients taking inhaled corticosteroids who are otherwise well controlled, consider the following therapies[1][**L2, RGA**]:

- Leukotriene receptor antagonists.
- Long-acting beta$_2$-agonists (LABAs).
- Theophylline may be used under the direction of an asthma-specialised physician [**R-GDG**].

11.5 Principles of Treatment

Principles of treatment of chronic asthma[1,2,7–9]:

- Optimisation of lung function.
- Relief of chronic symptoms with minimal medication.
- Prevention or decrease of asthma attacks.
- Minimisation of sleep disruption.
- Normalisation of everyday activities.
- Minimisation of medication side effects.
- Regular exercise unlimited by disease.
- Education and involvement of family in the management of asthma.

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11.6 Monitoring Asthmatic Patients

Monitoring[1,2]:

- Asthma is best monitored in primary care by routine clinical review on at least an annual basis [1][**L3, RGA**].
- Dedicated asthma clinics should be considered in primary health care in Qatar [**R-GDG**].
- Consider closer monitoring of individuals with poor lung function and a history of asthma attacks in the previous year[1,2,10].
- Monitor and record[1,2]:
    - Symptomatic asthma control – consider using one of the following:
        - GINA Asthma level of control criteria.
        - Asthma Control Questionnaire (ACQ).
        - Asthma Control Test (ACT).
    - Lung function assessed by spirometry or PEF at diagnosis, 3-6 months later and then every 3-12 months according to level of control.
    - Frequency of asthma attacks, oral corticosteroid use, and time off work since last assessment.
    - Inhaler technique (should be checked at least annually).
    - Adherence to treatment.
    - Bronchodilator reliance.
    - Self-management plans – review at least annually.

11.7 The Asthma Review

At each consultation, and before starting a new drug therapy, review the following[1,2,7,24,25]:

- Asthma education – including a written asthma action plan.
- Asthma control, treatment and goals.
- Compliance and inhaler technique.
- Trigger factors.
- Lifestyle advice.
- Vaccination status.

11.7.1 Asthma Education

Provide information on[1,2,7,24,28]:

- Basic facts about asthma.
- Roles of asthma medication i.e. ‘reliever’ versus ‘preventer’.
- Inhaler technique.
- Written asthma action plan[1,2,7,29]:
    - Offer all patients self-management education including a written personalised asthma action plan [**L1, RGA**].
    - The action plan:
        - May be based on symptoms and/or peak flow.
        - Should be regularly reviewed and adherence to the plan, checked.
    - Consider changing the action plan if:
        - Life goals change.
        - Diagnosis or prognosis change.
        - Health status changes.
        - Social support changes.
        - Medical evidence changes.

- Environmental control measures.
- Emphasise need for regular follow-up visits.

Technology enabled healthcare such as telemonitoring, automated reminders, and computer-based educational games to improve knowledge on asthma can be considered as options to support the management. These can improve different outcomes including adherence to monitoring, self-management skills and increased used of preventer medication [30–39].

11.7.2 Asthma Control and Treatment Goals

Assess control after initiating different therapies[1,2]:

- Review symptoms against GINA asthma control criteria.
- Consider using the Asthma Control Questionnaire (ACQ) or Asthma Control Test (ACT).
- Ask for a history of asthma attack or hospital admission.
- Use an objective measure of lung function to assess control, e.g. Spirometry or PEF.
- Check frequency of reliever medication use.

Good Control:
Control is ideal when patients[1,2]:

- Have no daytime symptoms.
- Have no asthma attacks.
- Are not requiring rescue medications.
- Are not waking at night.
- Have no limitations on activity, including exercise.
- Have normal lung function – FEV_1 and/or PEF greater than 80% of predicted or best.
- Minimal side effects from medication.

Step-Down Therapy:
Once asthma is controlled, stepping down therapy is recommended[1,2,7].
Step-down therapy[1,2,7]:

- Consider reduction in doses after a period of stability judged by symptoms and objective measurement of lung function.
- Review regularly when stepping down.
- When deciding which medication to step down first and at what rate, take into account:
    - Severity of asthma.
    - Treatment side effects.
    - Time on the current dose.
    - The achieved beneficial effect.
    - Patient preference.
- Maintain patients at the lowest possible dose of inhaled corticosteroid[40]:
    - Any reduction should be slow.
    - Consider 25-50% reductions in inhaled corticosteroids therapy every 3 months.
- Consider stopping Inhaled Long-acting beta-agonists (LABA) as soon as asthma control is achieved for at least 3 months[1,41].
- LABAs should not be used without concurrent inhaled corticosteroids[1,2,7,41].

11.7.3 Compliance and Inhaler Technique

Compliance and inhaler technique[1,2,7,39,42]:

- Check compliance by:
  - Direct questioning.
  - Reviewing prescription refill frequency.
- For people who are able, encourage patient-directed treatment adjustment based on the asthma plan.
- Observe inhaler technique before issuing the first prescription for an inhaler and at each visit document PEF measurement.

Choice of Inhaler Device[28]:
On selection of an inhaler device, it is important that consideration is given to other aspects of asthma care that influence the effective delivery of inhaled therapy, including[1,2]:

- Individual practical training in the use of the specific device.
- Monitoring of effective inhaler technique and adherence to therapy.
- Regular review (i.e. no less than annual) of inhaler needs, which may change over time with increasing age.
- Consider review by asthma educator, if available [**R-GDG**].
- Using mixed inhaler types may cause confusion or increased errors in use so using the same type of device may improve outcomes.
- If the patient is unable to use the device, an alternative should be found.

Spacers[1]:

- Administer the drug by repeated single actuations of the pMDI, each followed by inhalation.
- There should be minimal delay between actuation and inhalation.
- Tidal breathing is as effective as single breaths.
- Clean spacer monthly – wash in detergent and allow to dry in air. Wipe the mouthpiece clean of detergent before use.
- Replace plastic spacers at least every 12 months – some may require changing every 6 months.

11.7.4 Trigger Factors Including Smoking and Occupation

Consider and ask about exposure to triggers (see *Section 6*).

11.7.5 Lifestyle Advice

Offer the following advice[1,2,8,9,43]:

- Encourage smoking cessation in people who smoke.
- Weight reduction is recommended in obese patients with asthma to promote general health and to improve asthma control[44–46].
- Encourage all people with asthma to exercise regularly.
- Air ionisers are not recommended.
- Nutritional supplementation with vitamin D and fish oil might reduce the risk of wheezing and asthma exacerbations [2,32,47–50]

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11.7.6 Consider Vaccination Status

Consider vaccination status:

- Influenza vaccine is recommended on an annual basis to all patients diagnosed with asthma.
- Pneumococcal vaccination is recommended in immunocompetent adult patients diagnosed with asthma, unless contraindicated, as follows[51]:
    - Adults aged 19 to 64 years **with asthma,** administer 13-valent pneumococcal conjugate vaccine (PCV13) [52,53].
    - At age ≥65 years, administer PCV13 followed by 23-valent pneumococcal polysaccharide vaccine (PPSV23), at least 1 year after PCV13 and at least 5 years after the last dose of PPSV23.

11.8 Stepwise Pharmacological Management

Start treatment at the most appropriate step according to the initial severity of the patient's asthma[1,2,12,14,54]. Therapy should be stepped up or down depending on the degree of control of symptoms, until the patient is stable on the minimum medication necessary to control symptoms[1,2,12].

11.8.1 Step 1 - Intermittent Asthma

Prescribe a low dose inhaled corticosteroid[1,2,7,12][**L1, RGA**]:

- Add a short-term reliever therapy as needed.
- Frequency of follow-up is dependent on the severity of asthma.
- Assess urgently any patients prescribed more than one short acting bronchodilator inhaler per month and take measures to improve asthma control if it is found to be poor.

11.8.2 Step 2 - Regular Asthma Preventer Therapy

Prescribe a regular inhaled corticosteroids at a low dose, in addition to an inhaled short-acting beta$_2$ agonist (SABA) in patients with any of the following[1,2,12,40][**L1, RGA**]:

- Asthma attack in the last 1 year.
- Using inhaled beta$_2$ agonists 3 times per week or more.
- Symptoms are present 3 times per week or more.
- Waking one night per week or more due to asthma symptoms.

Prescribing inhaled corticosteroids[1,40]:

- A reasonable starting dose will usually be 400 micrograms beclometasone (or equivalent) per day.
- Note that some products are more potent – all should be prescribed by dose and brand.
- Give inhaled corticosteroids initially twice daily, except ciclesonide which is given once daily.
- Titrate the dose of inhaled corticosteroid to the lowest dose at which effective control of asthma is maintained.

11.8.3 Step 3 - Add-On Therapy

Add-on therapy:

- Long-acting beta$_2$-agonist (LABA) in addition to low-dose inhaled corticosteroid and as-required SABA[1,2,12,41,55].
    - LABAs have been shown to be more effective than leukotriene receptor antagonists.

  - Should only be considered in patients who are already taking inhaled corticosteroids.
  - Should be considered before increasing inhaled corticosteroid dose above 800 micrograms beclomethasone (or equivalent) per day.
- Salmeterol or formoterol and vilanterol can be used in conjunction with inhaled corticosteroids (dose depends on age, device used and severity of symptoms)

Once benefit of a long acting beta$_2$ agonist has been demonstrated, prescription in a combination inhaler with inhaled corticosteroid is recommended[1,2,41,55]. Use of long acting beta$_2$ agonist without inhaled corticosteroid is not advised, and combination inhalers prevent this occurring[1,2,41].

Inadequate Control with Inhaled LABA

If there is some benefit but asthma control remains suboptimal[1,2,55]:

- Continue inhaled LABA; and
- Increase the dose of inhaled corticosteroids to beclometasone 800 micrograms/day (or equivalent).

If there is no response to LABA[1]:

- Increase the dose of inhaled corticosteroids to beclometasone 800 micrograms/day (or equivalent.
- If control continues to remain inadequate, consider sequential trials of another add-on therapy such as:
  - Leukotriene receptor antagonist.
  - Theophyllines (to be used with caution in patients with co-existing cardiac disease) [**R-GDG**].

In selected adults who have poor control of their asthma – use of budesonide/formoterol in a single inhaler as rescue medication (instead of a SABA), in addition to its regular use as controller therapy has been shown to be an effective treatment regimen[1]:

- When this management option is introduced the total regular dose of daily inhaled corticosteroids should not be decreased.
- Patients taking budesonide/formoterol as rescue medication once a day or more, should have their treatment reviewed.

11.8.4 Step 4 - Persistent Poor Control

If control remains inadequate on 800 micrograms beclomethasone (or equivalent) daily of an inhaled corticosteroid plus a LABA and as-required SABA, consider the following interventions[1,2,40]:

- Increasing inhaled corticosteroids to 2000 micrograms/day of beclometasone based on severity of disease.
- Leukotriene receptor antagonist.
- Theophyllines (to be used with caution in patients with co-existing cardiac disease)[**R-GDG**].
- Long acting muscarinic antagonists (LAMA) such as tiotropium bromide in Respimat device not in handihaler [1,2,32,56,57]

11.8.5 Step 5 – Continuous or Frequent use of Oral Corticosteroids

For the small number of patients not controlled at step 4, use daily corticosteroid tablets in the lowest dose providing adequate control. Before preceding to step 5 however, refer patients with inadequately controlled asthma to an **asthma-specialised physician**[1,2].

Management with oral corticosteroids[1,2,40]:

- Use the lowest dose that will provide adequate control of symptoms.

- Maintain a high dose of inhaled corticosteroid.
- Review history and examination, particularly asking about and looking for indications of steroid-induced adverse effects.
- Prevent and treat steroid-induced adverse effects[40]:
    - Loss of bone mineral density – those people receiving prednisolone for more than 3 months should be prescribed a bisphosphonate:
        - Do not prescribe a bisphosphonate to women who are pregnant or breastfeeding.
        - Consider alternatives in women of childbearing age.
    - Monitor blood pressure and dyslipidaemia.
    - Check for diabetes mellitus.
    - Consider checking for cataracts.

Review of treatment by asthma-specialised physician[1,2]:

- Stop the trial of oral corticosteroids after 6 weeks, if there is no reduction in corticosteroid use, improvement in symptoms, or lung function during that time.
- Experienced centres may consider a 3 months trial of immunosuppressants (e.g. methotrexate or ciclosporin) if other treatments have proved unsuccessful (and the risks and benefits have been discussed with the patient).
- Phenotype patients and define inflammatory characteristics.
- In patients with allergic bronchopulmonary aspergillosis, consider a four months trial of itraconazole as this may decrease steroid tablet dose and improve control.

11.8.6 Poor Response to Step 4 or Step 5 Treatment

Patients who continue to have persistent symptoms and/or frequent asthma attacks despite treatment at step 4 or step 5 should be assessed through a multidisciplinary 'difficult asthma' service and should include[1]:

- Confirmation of the diagnosis.
- Identification of the mechanism of persisting symptoms.
- Assessment of adherence to therapy – consider this before escalating treatment.
- Assessment of co-existent psychological morbidity.
- Assessment for dysfunctional breathing syndrome.
- Allergen testing to moulds.
- Consideration of induced sputum eosinophil count monitoring to guide steroid treatment.

11.8.6.1 Additional Therapies for Consideration

Immunotherapy[1]:

- Subcutaneous or sublingual immunotherapy is not routinely recommended for the treatment of asthma however, may be considered in selected patients with proven hypersensitivity to specific allergens.
    - Anti-IL5 therapy (subcutaneous mepolizumab or benralizumab or IV Reslizumab) in severe eosinophilic asthma patients[58–67].
    - sublingual immunotherapy (SLIT) in house dust mites (HDM) allergic rhinitis patients with FEV_1 >70% predicted [2,32,68]

Biological therapy[1,2,69]:

- Consider omalizumab add-on therapy who do not respond to treatment:
- Omalizumab is a monoclonal antibody that binds to IgE, given subcutaneously every 2 or 4 weeks.
- Omalizumab is recommended as an add-on therapy to treat severe persistent confirmed allergic, IgE-mediated, asthma, (with serum IgE levels of 30-700IU/ml) in adults and children aged 6 years

and older who need continuous or frequent oral corticosteroid treatment, as defined as 4 or more courses of oral steroids in the previous year[69][**L2, RGA**].

- Treatment should only be initiated in specialist centres with special expertise in the evaluation and management of patients with severe and difficult asthma [**R-GDG**].
- Patients who may benefit the most from omalizumab are those with very severe asthma, such as those who are on maintenance oral corticosteroids, or who have been hospitalised because of asthma in the previous year.
- Use of omalizumab as an add-on to optimised standard therapy is more clinically effective in treating severe persistent allergic asthma than optimised standard therapy alone.
- Patients should be assessed for the effectiveness of omalizumab at 16 weeks – continue only in those who have markedly improved.

Bronchial Thermoplasty[1,70]:

Bronchial thermoplasty decreases bronchial smooth muscle mass and has been shown to improve symptoms and quality of life in selected patients with severe asthma[70][**L2, RGA**]:

- May be used if there are special arrangements for clinical governance, consent, and audit or research.
- Patient selection and treatment should be by a respiratory team with special expertise in managing severe and difficult asthma [**R-GDG**].

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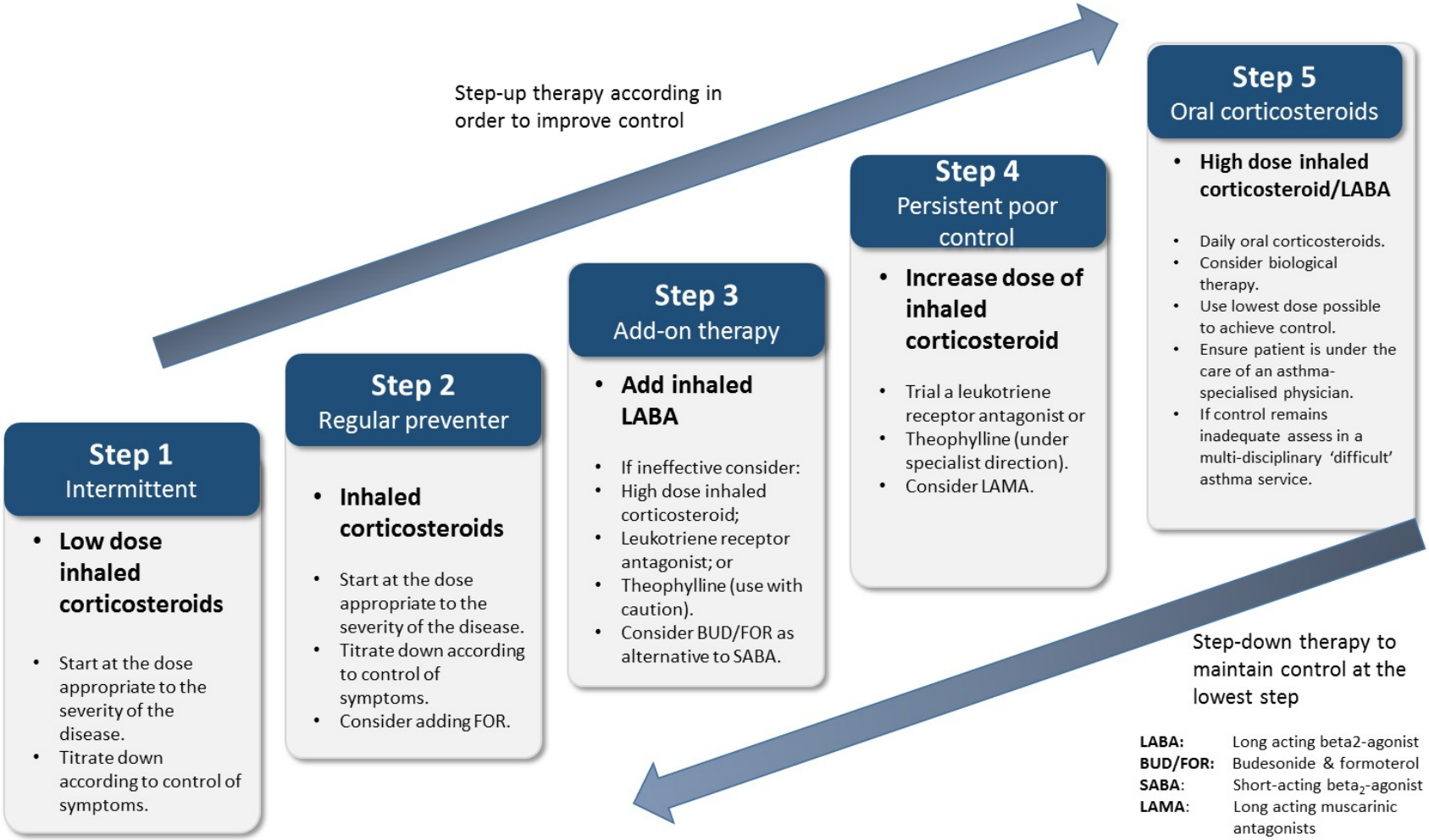

Fig 11.7: Stepwise Management of Asthma in Adults[1,2].

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11.9 Referral for Specialist Assessment

Consider referral for specialist assessment if[1,2,7][**L2, RGA**]:

- The diagnosis is unclear.
- Suspected occupational asthma.
- Unexpected clinical findings e.g.:
    - Persistent non-variable breathlessness.
    - Chronic sputum production.
    - Cyanosis.
    - Finger clubbing.
    - Crackles/crepitations on auscultation.
    - Monophonic wheeze or stridor (indicative of upper airways obstruction).
    - Cardiac disease.
    - Prominent systemic features, e.g. myalgia, fever, weight loss.
- Unexplained restrictive spirometry.
- Shadowing on chest radiograph.
- Marked blood eosinophilia (more than $1x10^9$/L).
- Poor response to asthma treatment:
    - Before proceeding to Step 5 management, refer patients with inadequately controlled asthma to specialist care.
- Severe acute asthma attack.
- New onset asthma symptoms in the elderly.

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12 Inpatient Management

The management of acute asthma is described in *Section 10*.

12.1 Observation Care Criteria

Observation care e.g. in the Emergency department or Medical Assessment Unit, may be appropriate for patient with moderate to severe asthma with any of the following[1,2,8,24][**L1, RGA**]:

- Patient has received acute treatment for 1 to 2 hours.
- Significant findings persist - as indicated by any of the following:
    - Respiratory rate greater than 24 breaths per minute.
    - Continued accessory muscle use.
    - Continued retractions.
    - Patient unable to complete full sentences in one breath.
    - PEF less than 50% of predicted or personal best.
    - PEF less than 75% of predicted or personal best with an identified risk factor, i.e.:
        - History of sudden severe asthma exacerbation.
        - History of intubation for asthma.
        - Previous inpatient admission for asthma in past 12 months.
        - Three or more emergency care visits for asthma in previous 12 months.
        - Hospital or emergency care visit for asthma in past month.
        - Use of more than 2 canisters of inhaled SABA per month.
        - Inadequate access to medical care or medications.
        - Lack of transportation to hospital.
        - Home circumstances do not allow for adequate home care.
        - Pregnancy.
        - Comorbidity (e.g., cardiovascular disease, other chronic lung disease).

12.2 Inpatient Admission Criteria

Admission is indicated for any of the following[1,2,8,9][**L2, RGA**]:

- Ventilatory support required.
- PEF less than 33% of predicted or personal best before treatment.
- PEF less than 50% of predicted or personal best after treatment.
- Oxygen saturation less than 92%.
- PaO_2 less than 8.0 kPa (60mmHg).
- $PaCO_2$ of 5.6 kPa (42 mmHg) or greater.
- Cyanosis.
- Absent or markedly diminished breath sounds (silent chest).
- Cardiac dysrhythmia (e.g. bradycardia).
- Haemodynamic instability.
- Change in mental status.
- Radiographic evidence of complication requiring inpatient treatment (e.g. pneumonia, pneumothorax).
- Respiratory finding that is severe or persistent (e.g. dyspnoea, tachypnoea, accessory muscle use).
- Airflow measurements less than 50% of predicted or personal best that persist (e.g., over 24 hours) or worsen despite treatments.
- Supplemental oxygen, respiratory treatments or monitoring that are performable only in acute inpatient setting.

12.3 ICU Admission Criteria

Admission to ICU is appropriate for any of the following[1,2,71][**L2, RGA**]:

- Impending or actual respiratory arrest.
- Need for mechanical ventilation.
- PEF less than 33% of predicted or personal best.
- PEF or FEV_1 less than 40% of predicted after initial treatment.
- Persistent or worsening hypoxia.
- Acidosis.
- Hypercapnia.
- Severe drowsiness, confusion or coma.
- Requirement for continuous inhaled bronchodilators.

12.4 Goal Length of Stay

Patients should ideally be managed on an outpatient basis or in an observation care setting. However if inpatient admission is indicated, the optimal length of stay for admission is 1 day[6][**L3**].

12.5 Extended Stay Criteria

Extended stay is classified as:

- Minimal stay (a few hours to 1 day)
- Brief (1 to 3 days)
- Moderate (4 to 7 days)
- Prolonged (more than 7 days).

Extended stay, beyond goal length of stay, may be needed for[9,71–76][**L1**]:

- Severe respiratory failure:
    - Anticipate possible mechanical ventilation or non-invasive positive pressure ventilation.
    - Patient requiring mechanical ventilation or non-invasive ventilation for status asthmaticus may require longer duration of therapy before adequate response.
    - Anticipate intense bronchodilator treatment with continuous nebulisation.
    - Expect brief to moderate stay extension.

- Status asthmaticus:
    - Resistant and severe signs and symptoms of asthma despite aggressive conventional treatment, including intubation and mechanical ventilation, may require general anaesthesia.
    - Expect brief to moderate stay extension.

- Chronic obstructive asthma:
    - Severe attacks may result in slow resolution of admission indicators.
    - Anticipate continued intense bronchodilation treatment and flow monitoring.
    - Expect brief stay extension.

- Secondary causes and complications:
    - Infectious causes (e.g. pneumonia) and asthma complications (e.g. pneumothorax) may require additional therapy.

  - Expect brief stay extension.
  - Clinically significant exacerbation of comorbidities (e.g. congestive heart failure, atrial fibrillation).
  - Anticipate specific treatment of comorbidity.
  - Expect brief stay extension.

- Slow resolution:
  - Severe attacks may result in slow resolution of admission indicators.
  - Anticipate continued intense bronchodilation treatment, flow monitoring, and oxygen as needed.
  - Expect brief stay extension.

- Older patient:
  - Patient 65 years or older may require longer acute hospital care.
  - Expect brief stay extension.

12.6 Readmission Risk

Risk of readmission is increased by presence of any of the following[1,2,8,9,77–83][**L1**]:

- Non-elective hospitalisation in past 6 months.
- 2 or more Emergency Department visits in past 6 months.
- No source of outpatient care other than emergency department (e.g. no primary care provider).
- Severe care transition barriers (e.g. no caregiver).
- Severe or end-stage renal disease (on dialysis or GFR less than 30 mL/min/1.73m^2 (0.5 mL/sec/1.73m^2)).
- AIDS (i.e. not only HIV-positive).
- Metastatic solid tumour (e.g. lung cancer, breast cancer).
- Advanced liver disease (e.g. cirrhosis with portal hypertension, history of variceal bleed).

13 Key Considerations for Patient Preferences

Patient preferences refer to patient perspectives, beliefs, expectations, and goals for health and life, and to the steps employed by individuals in assessing the potential benefits, harms, costs, and limitations of the management options in relation to one another. Patients may have preferences when it comes to defining their problems, identifying the range of management options and selecting or ranking the outcomes used to compare these options.

It is important for healthcare professionals to develop an understanding of the patient as an individual and the unique way in which each person experiences a condition and its impact on their life.

The following recommendations are therefore made for physicians and other healthcare professionals regarding general principles of patient care in Qatar:

- **Respect Patients:** Treat patients with respect, kindness, dignity, courtesy and honesty. Ensure that the environment is conducive to discussion and that the patient's privacy is respected, particularly when discussing sensitive, personal issues. Ask the patient how they wish to be addressed and ensure that their choice is respected and used.

- **Maintain Confidentiality:** Respect the patient's right to confidentiality and avoid disclosing or sharing patients' information without their informed consent. In this context, students and anyone not directly involved in the delivery of care should first be introduced to the patient before starting consultations or meetings, and let the patient decide if they want them to stay.

- **Clarify Third-Party Involvement:** Clarify with the patient at the first point of contact whether and how they like their partner, family members or carers to be involved in key decisions about their care or management and review this regularly. If the patient agrees, share information with their partner, family members or carers.

- **Obtain Informed Consent:** Obtain and document informed consent from patients, in accordance with MOPH policy and guidance.

- **Encourage Shared Decision Making:** Ensure that patients are involved in decision making about their own care, or their dependent's care, and that factors that could impact the patient's participation in their own consultation and care including physical or learning disabilities, sight, speech or hearing impairments and problems with understanding, reading or speaking English are addressed.

- **Disclose Medical Errors:** Disclose errors when they occur and show empathy to patients.

- **Ensure Effective Communication:** Explore ways to improve communication including using pictures, symbols or involving an interpreter or family members. Avoid using medical jargon. Use words the patient will understand and confirm understanding by asking questions.

- **Ensure Continuity of Care:** Provide clear and timely sharing of patient information between healthcare professionals especially at the point of any transitions in care.

14 Performance Measures

Below is a list of potential performance measures that are proposed for the evaluation of provider concordance with guidelines recommendations:

Number	Numerator	Denominator
AA01	Number of adult patients with asthma aged 18 years and older, who have had an asthma review in the preceding 12 months that includes an assessment of asthma control.	Total number of adult patients diagnosed with asthma.
AA02	Number of adult patients with newly diagnosed asthma whose notes describe the process (including history, examination and investigations) by which the diagnosis was made	Total number of adult patients diagnosed with asthma in the previous 12 months.
AA03	Number of adult patients with new onset asthma who are assessed for occupational causes.	Total number of adult patients diagnosed with asthma.
AA04	Number of adult patients treated in hospital for an acute exacerbation of asthma who receive a written personalised action plan before discharge.	Total number of adult patients treated in hospital for an acute exacerbation of asthma.
AA05	Number of patients >18 years presenting to a healthcare professional with a severe or life-threatening acute exacerbation of asthma who receive oral or intravenous steroids within 1 hour of presentation.	Total number of adult patients presenting to a healthcare professional with a severe or life-threatening acute exacerbation of asthma.
AA06	Number of asthma patients aged 18-55 years who visited an emergency department for treatment.	Total number of patients aged 18-55 years who have been diagnosed with asthma.

Table 14.1: Performances Measures

15 References

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Appendix: Detailed Description of the Literature Search

All existing references were evaluated and where necessary and applicable, the latest version of the specific manuscript was used to update the guideline and replace the older reference. The search for clinical practice guidelines on asthma diagnosis and/or management in adults, was performed in the *PubMed* database and websites of relevant organisations and societies. The present guideline is primarily based on UK NICE guidelines, Scottish Intercollegiate guidelines, British Thoracic Society guidelines, Global Initiative for Asthma management guideline, Irish National Clinical Effectiveness Committee guideline, American Academy of Family Physicians guideline, National Asthma Council Australia guideline, Saudi Thoracic Society guidelines and is supplemented with other relevant studies.

The included publications were identified using the term “asthma” and specified with the following terms in combinations:

guidelines, disease, adults, prognosis, acute, chronic, severe asthma, upper respiratory tract infection, wheeze, cough, bronchodilators, exacerbation, oxygen saturation, peak expiratory flow rate, control, exercise, preventative therapy, step-wise, classification, spirometry, diagnosis, management, admission, readmission, discharge, chest radiograph, intensive care unit, treatment, bronchial thermoplasty, chest tightness, corticosteroids, severity, atopy, fractional inhaled nitric oxide, probability, psychological factor, inhaler technique, inhaler device, vaccine, add-on therapy, length of stay.

Furthermore, to investigate any emerging evidence, the literature has been searched as described in the below mentioned diagram:

View Pathway

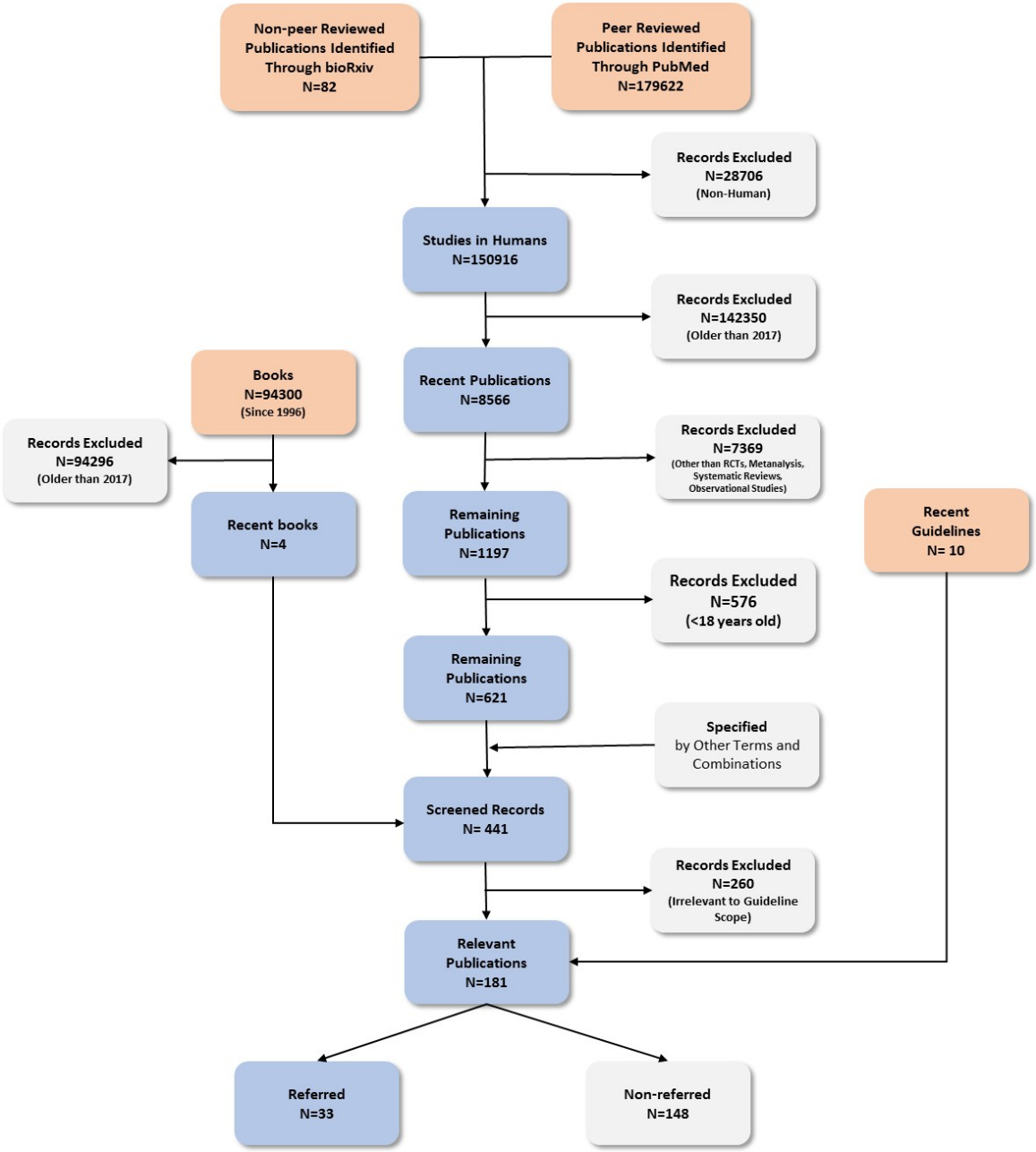

Fig A.1: Literature search results and application of exclusion criteria.

View Pathway

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- **Dr Mehmood Syed,** *Project Clinical Lead.*
- **Dr Samuel Abegunde,** *Physician Executive.*
- **Dr Natalia Siomava,** *Senior Medical Writer.*
- **Ms Rouba Hoteit,** *Medical Writer.*

Please use the following email address to provide feedback on this guideline:
clinicalguidelines@moph.gov.qa