Pocket guide Asthma

DEVELOPED BY EUFOREA EXPERT TEAMS BASED ON INTERNATIONAL GUIDELINES

EUFOREA

Aim of the EUFOREA Asthma Pocket Guide

This asthma pocket guide addresses adolescents (≥12 years) and adults and is aimed for non-respiratory clinicians:

- to aid identification of symptoms and signs consistent with the diagnosis of asthma and its most common comorbidities
- to provide a shortlist of:
  - the major differential diagnoses
  - the most important diagnostic tests
  - key treatable traits and point-of-care biomarkers
  - the most common non-pharmacological and pharmacological treatment options
- to offer a practical guide for specialist referral

What is Bronchial Asthma ?

Asthma is a common chronic inflammatory condition of the lower airways which may present at any age. Presently, it affects over 350 million people worldwide and its prevalence is increasing.

Asthma usually manifests by "twitchy", i.e. hyperresponsive, airways to a vast array of (non)specific stimuli. If not treated adequately, exacerbations may occur often requiring systemic corticosteroids and even hospitalisation. Frequent exacerbations lead to accelerated lung function decline, airway wall thickening and mucus hypersecretion (referred to as 'airway remodeling').

Given its heterogeneity, variable course over-time, associated comorbid conditions and varying presentations, asthma is often under- or misdiagnosed and co morbidities are often overlooked. Thus, asthma often remains under-treated, impacting individual patients and their families as well as imposing a major socio-economic burden.

Cornerstones of Asthma Diagnosis

POSITIVE HISTORY (FAMILY/PATIENT)

Symptoms/signs
(variability: diurnal, over time)

- Cough
- Chest tightness
- Shortness of breath
- Wheezing

Identify provoking triggers

- Irritants, cold (dry) air, exercise
- Respiratory viral infections
- Allergens
- Environmental factors (indoor/ outdoor)
- Occupational irritants
- Psychological stress
- Food allergy
- Aspirin/nonsteroidal anti-inflammatory drugs (NSAID) sensitivity
- Smoking/vaping

CONFIRM VARIABLE LUNG FUNCTION (p. 11; p. 22)

Non-pharmacological test (ambulatory)

- PEF spontaneous variability (diurnal variation measured over 7 days: ≥10% on average)
- PEF variability to stimuli (e.g. exercise or occupational stimuli: ≥15%)

Pharmacological test (in clinic/ laboratory setting)

- FEV1 or FVC reversibility to SABA (≥12% and 200mL)
- Reactivity to direct or indirect stimuli (methacholine/ histamine; mannitol; exercise or cold, dry air)

EXCLUDE DIFFERENTIAL DIAGNOSES (p. 10)

- Intrathoracic
- Extrathoracic

IDENTIFY COMORBIDITIES AND TREATABLE TRAITS (pp 12; 14-15)

PERFORM INFLAMMOMETRY (p. 13)

- Allergy tests
- Blood eosinophils
- FeNO

Cornerstones of Asthma Diagnosis and Management

1. Diagnose Asthma

- History (p 6-9)
- Symptoms (p 6-9)
- Physical Exam (p 9)
- Lung function testing (p 11)

2. Identify treatable traits

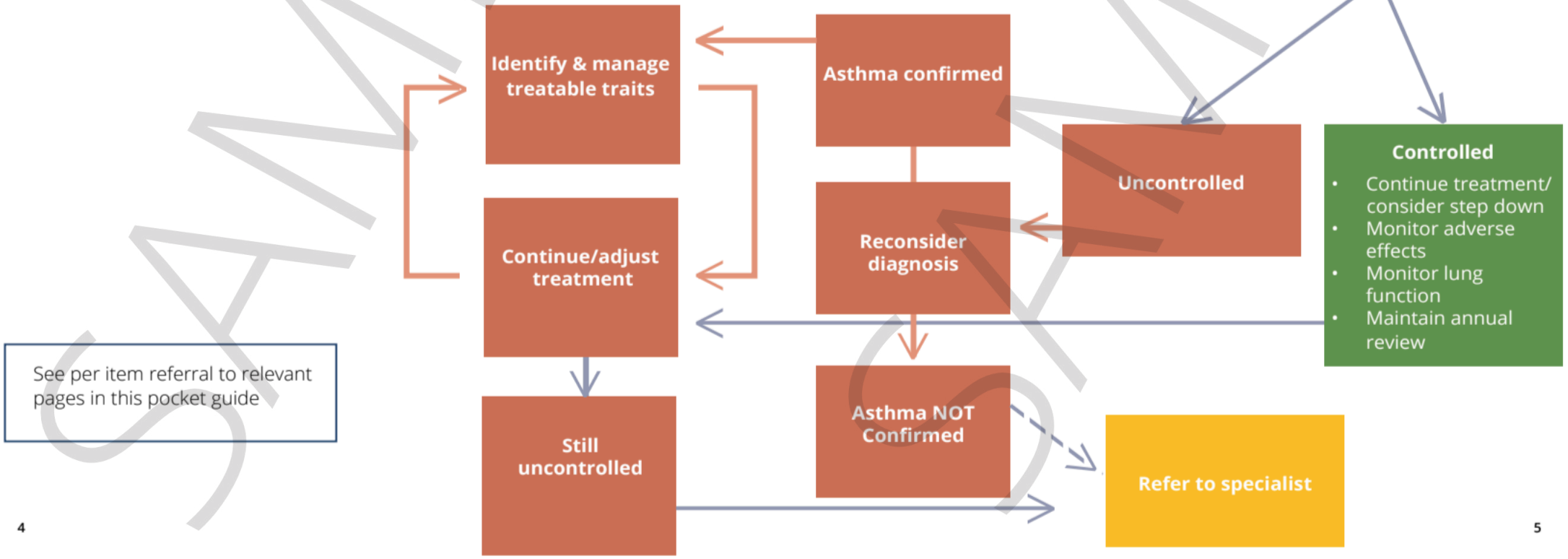
- Triggers and Comorbidities (pp 6; 8-9; 12)
- Inflammometry (p 13)
- Lifestyle and environmental factors (pp 14-15)

3. Treat Patient

- Non-pharmacological (p 17)
- Pharmacotherapy (p 17)
- AIT (p 16; p 19)

4. Monitor

- Assess asthma control and comorbidities/TTs (pp 12, 13, 20-22)
- Adherence
- Inhalation technique
- Adverse effects of pharma-cotherapy (pp 18-19)
- Lung function testing (p 11)



See per item referral to relevant pages in this pocket guide

History, Signs & Symptoms

Family history

- Asthma / bronchitis
- Allergy
- Other respiratory diseases (COPD, etc)

Patient-Specific

Childhood/past history:

- Preterm birth? Low birth weight? Breastfed?
- Recurrent respiratory infections accompanied by wheezing?
- Any respiratory hospitalisations (+/- ventilation)/Antibiotics?
- Exposure to tobacco smoke or noxious chemicals (includes occupational exposure)?
- Exposure to domestic animals/ pets or mold?
- Allergies (airborne/food)?
- Atopic dermatitis?
- Vaccination status?

Current Symptoms

LOWER AIRWAYS?

- Cough
- Dyspnoea
- Wheeze
- Chest tightness

SINONASAL?

- Nasal secretions/nasal congestion/sneezing/ocular itch/frontal headache/facial pain/postnasal drip/nasal itch
- Smell dysfunction/snoring

Relationship with triggers?

Triggers

- **Indoor:** allergens/pets, HDM, molds, chemicals, odors, fumes, cigarette smoke, vapors, poor ventilation,
- **Outdoor: allergens**: seasonal (pollens), animals (e.g. horse), cold (dry) air, exercise, respiratory viruses
- **Endogenous:** GERD, psychological stress, food allergy, drugs
- **Exposures:** occupational/noxious chemicals/air pollutants

Lifestyle factors:

- Occupation/activities/exercise
- Food/diet/alcohol/recreational drugs
- Smoking history (incl. e-cigarettes, vaping, passive smoking)

Questions on TYPICAL ASTHMA SYMPTOMS:

- ☐ Do you experience episodes of wheezing, dyspnoea or dry cough upon exposure to certain triggers (weather changes/irritants/ allergens/exercise)?
- ☐ Do you wake up at night due to chest symptoms or troublesome cough?
- ☐ Do you cough or wheeze upon exercise or upon exposure to irritants or allergens?
- ☐ Do you experience extended common cold/laryngitis/ bronchitis?
- ☐ Does your chest feel tight or do you feel any shortness of breath in relation to triggers such as weather change (fog/wind); environmental change (cold/warm/smog); exercise; allergens; irritants; psychological stress?

If YES to ANY of these questions: your patient might have asthma and should be evaluated by lung function testing and inflammometry (pp 11,13)

Symptoms/signs LESS SUGGESTIVE of asthma:

- ☐ No response to (adequately used) asthma treatment
- ☐ Inspiratory stridor or wheeze → Consider VCD, EILO
- ☐ Productive cough with colored sputum → Consider infectious bronchitis/ bronchiectasis)
- ☐ Dyspnoea with dizziness, numbness in hands/feet (+/- history of hyperventilation syndrome) → Consider dysfunctional breathing, psychological factors)
- ☐ Postural dyspnoea / dyspnoea at rest / exercise-induced dyspnoea in a patient with (a history of cardiovascular disease → Consider cardiac asthma)

Suspected Asthma? Always check the upper airways!

- Asthma often coexists with upper airway disease: up to 80% of patients with allergic asthma have coexistent allergic rhinitis (AR). Similarly, there is an association between asthma and chronic rhinosinusitis with or without nasal polyps (CRSwNP or CRSsNP, respectively).
- Aspirin or NSAIDs-exacerbated disease (AERD/NERD) is usually consistent with both (more severe) asthma and CRSwNP.
- Physicians treating asthma should therefore proactively diagnose and treat coexistent upper airway disease.

Symptoms suggestive of AR related to allergen exposure

- Rhinorrhoea or runny nose with a clear watery discharge
- Sneezing
- Nasal itch
- Nasal obstruction
- Ocular symptoms (irritation, itch, redness, tearing)

If **YES** to 2 or more of these symptoms for >1 hour following allergen exposure: consistent with AR; allergy (skin or serological) tests should confirm the diagnosis. See AR pocket guides (paediatric and adult).

Symptoms suggestive of CRS

- (Bilateral) nasal congestion/obstruction
- Nasal secretions (rhinorrhoea and/or post-nasal drip)
- Smell dysfunction (hyposmia or anosmia)
- Facial pain /headache
- Morning productive cough / postnasal drip with thickened mucus

If **YES** to 2 or more of these symptoms for ≥3 months, confirm CRS diagnosis with nasal endoscopy or CT scan. See CRS pocket guide.

Symptoms LESS suggestive of AR or CRS

- Unilateral symptoms
- Colored secretions
- Recurrent epistaxis (in the absence of nasal corticosteroids use)
- Isolated rhinorrhoea (i.e., unrelated to allergen exposure with negative allergy tests)

Physical examination

Although physical examination in asthma may not be informative or conclusive, special attention should be paid to:

- **Face:** breathing pattern, shiners, transverse nasal crease, eyes
- **Skin** (xeroderma, atopic eczema, urticaria)
- **Body habitus** (obesity?)
- **Thorax** (shape/movements)
- **Vertebral spine** (shape/movement)
- **Upper airways** (nose shape/sinus tenderness/nasal congestion/ hearing)
- **Lower airways** (incl.. auscultation upon forced expiration)
- **Heart:** sounds/murmurs

1. EUFOREA Allergic Rhinitis Pocket guide
2. EUFOREA CRS Pocket guide

Differential diagnoses

Intrathoracic

Pulmonary:

- Chronic obstructive pulmonary disease (COPD)
- Asthma-COPD overlap (ACO)
- Eosinophilic bronchitis
- Infectious lung disease
- Allergic bronchopulmonary aspergillosis (ABPA)
- Congenital airway anomalies
- Foreign body aspiration
- Cystic fibrosis
- Bronchiectasis
- Idiopathic pulmonary fibrosis

Extrapulmonary:

- Heart Failure

Extrathoracic

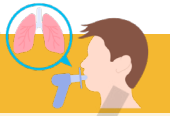
Upper respiratory tract

- CRS with post-nasal drip
- Exercise-induced laryngeal obstruction (EILO)
- Vocal cord dysfunction (VCD)

Dysfunctional breathing

- Psychological disorders
- Hyperventilation
- Deconditioning
- Obesity

Lung function testing



Although asthma may present with normal lung function or initial irreversible airway flow obstruction, confirmation of a variable lung function is usually part of asthma diagnosis. Variability may be demonstrated either spontaneously or through pharmacological intervention (reversibility test) or upon bronchoprovocation (inducing bronchoconstriction by pharmacological or physiological stimuli).

Confirmation of variable Lung Function:

Ambulatory tests

- **PEF spontaneous variability** (diurnal variation measured over 7 days: ≥10% on average)
- **PEF variability to stimuli** (e.g. exercise or occupational stimuli: ≥15%)
- **PEF reversibility** ≥20% 15 mins after 2-4 puffs of SABA

Laboratory tests

- Reversibility of FEV1 or FVC to SABA (≥12% and 200mL)
- Reactivity to direct or indirect stimuli:
- Methacholine/histamine (PC20 or PD20)
- Mannitol (PC15 or PD15)
- Exercise or cold, dry air (≥15% fall from baseline FEV1)

1. GINA 2022 (https://ginasthma.org)
2. Bourdin A, et al. European Respiratory Journal 2019 54: 1900900; doi: 10.1183/13993003.00900-2019
3. FitzGerald JM, et al. ERJ Open Res 2020; 11;6(3):00359-2019. doi: 10.1183/23120541.00359-2019.

Comorbid conditions

Comorbid conditions are common in asthma. Especially in patients with more severe asthma, these comorbidities and other co-existing conditions may negatively affect asthma control.

Causal (sharing common immune/pathological mechanisms)

- CRSwNP,CRSsNP, Allergic Rhinitis
- Atopic dermatitis
- Food allergies
- Aspirin or NSAIDs-exacerbated disease (AERD/NERD)

Co-existing (see referrals p 24)

- Psychological or personality disorder
- Intentional and unintentional non-adherence
- Primary and secondary immunodeficiencies
- Metabolic disorders, Diabetes, Obesity
- Thyroid disease
- Smoking/vaping/exposure to noxious chemicals
- Gastro-oesophageal reflux disease (GERD)
- COPD, Chronic bronchitis
- Obstructive Sleep Apnoea (OSA)
- Recurrent respiratory tract infections, Bronchiectasis

1. GINA 2022
2. Boulet LP. European Respiratory Journal 2009 33: 897-906; DOI: 10.1183/09031936.00121308
3. Diamant Z, et al. Allergy. 2019 Oct;74(10):1835-1851. doi: 10.1111/all.13806.PMID: 3095357

Asthma subtypes & Inflammometry

Currently **two major asthma subtypes** have been defined based on underlying immunological/inflammatory mechanisms:

- Type2 (or T2-high) and
- non-Type2 (or T2-low) asthma

Type 2 asthma is common and if early onset, usually presents with either allergy with or without prominent eosinophilia or, if late onset, with non-allergic eosinophilic inflammation.

Type 2 asthma is associated with:

- High risk of exacerbations and accelerated lung function decline
- High occurrence of CRSwNP
- T2-inflammation which can manifest as:
  - Allergic (positive allergy test and related symptoms)
  - Blood eosinophilia (≥300 cells//µL); (≥150 cells/µL if on SCS)
  - Fractional exhaled nitric oxide (FeNO) ≥25 ppb
- Good response to corticosteroids
- Good response to T2-targeted biologics (severe T2 asthma)

Inflammometry allows **subtyping (pheno/endotyping)** of individual patients, to **predict responsiveness to standard of care** (ICS) and/or **T2-targeted treatment options** (specialist care). FeNO may also serve as a check on adherence.

Currently applicable point-of-care biomarkers*):

- Skin prick test (SPT) ≥3 mm (mean perpendicular diameter) and/or
- Serum total and allergen-specific IgE (dependent on local laboratory)
- Blood eosinophils (≥300 cells/µL) (≥150 cells/µL if on SCS)
- FeNO (≥25 ppb)

**) SPT, blood eosinophils and FeNO may normalize with systemic corticosteroids (SCS/OCS) . Blood eosinophils are highly variable and require repeated (≥3) measurements on different days*

Treatable traits

Definition:
Treatable traits (TTs) are clinically relevant (phenotypic or endotypic) characteristics which can be identified, measured and treated (or modified). In this context, comorbidities are also considered TTs. The TT approach to asthma recognizes its multidimensional nature and associations at different levels (domains) and allows a personalized treatment strategy with patient engagement and shared-decision making. Proactive identification and treatment of TTs helps to improve asthma control and quality of life while reducing exacerbations and healthcare use. Some of the TTs require referral to specialist/multidisciplinary approach.

Pulmonary domain	Marker/Parameter	Treatment/Action
Airflow limitation/airway hyperresponsiveness	Spirometry (FEV1 <80% of predicted value; FEV1/FVC <0.75)	Add LABA (+/-) LAMA to ICS; bronchial thermoplasty*
	Reversibility to SABA ≥12%+200mL	ICS + LABA
	Bronchoprovocation testing*)	see p 11
Small airways disease (SAD):	Spirometry (FEF25-75); plethysmography; MBW; IOS; imaging; CalvNO*)	Small particle inhalers; inhalation chamber; systemic treatment
Emphysema / COPD	Chest CT scan; DLCO, lung compliance measurement*)	Smoking cessation
Recurrent respiratory infections/mucus hyperproduction	Sputum culture	Antibiotics; long term low-dose macrolides*
Bronchiectasis (Common cause of recurrent respiratory infections)	Chest CT scan*)	Drainage; mannitol/ saline inhalations; nebulized bronchodilators; macrolides*
Airway inflammation/biomarkers (p 13)		
Eosinophilic:	Blood eosinophils ≥300 cells/ µL (≥150 cells/µL if on SCS)	Inhaled corticosteroids; (short course of OCS); biologics*
Type 2 inflammation:	FeNO ≥ 25 ppb	Inhaled corticosteroids; (short course of OCS); biologics*

*) in specialist setting or initiated by specialist
**) see EUFOREA AR/CRS pocketguides

Extrapulmonary domain	Marker/Parameter	Treatment/Action
Allergic rhinitis	Allergy test (skin/serum); relationship symptoms and exposure	Avoidance; antihistamines; nasal CS; AIT*; **
CRSwNP/CRSsNP	Nasal endoscopy/CT scan*)	Saline irrigations/nasal CS/ OCS; surgery; biologics*;**
AERD/NERD	Blood eosinophilia; history of aspirin/NSAIDs intolerance; CRSwNP	Avoidance; desensitisation*); ICS/OCS/LTRA; biologics*
Obesity	BMI, body composition	Refer to dietitian; physical activity; exercise, surgery*
OSA	Apnoea screen, Apnoea index, nocturnal desaturations	CPAP
GERD	Gastrointestinal endoscopy, oesophageal 24h pH-test*	Proton pump inhibitors; lifestyle adjustment*
Psychological factors (depression/anxiety/ stress)	Questionnaires; psychological/psychiatrist assessment*	Psychotherapy; pharmacotherapy*

Lifestyle /behavioral factors	Marker/Parameter	Treatment/Action
Intentional and unintentional non-adherence	Patient history; prescription refill rate; smartinhalers	Education; discuss economic factors; frequent assessment of technique; smart inhalers; self-management support
Inadequate inhaler technique	Observed inhalation	Education; frequent assessment of technique; smart inhalers
Smoking/vaping/ exposure to noxious chemicals	Patient history; cotinine test	Smoking cessation; improve ventilation
Domestic pets/ allergens	Patient history; allergy tests: Gastrointestinal endoscopy, oesophageal 24h pH-test	Education; avoidance; improved ventilation; TLA device; AIT*

1. Agusti A, et al. Respir Med. 2021 Oct;187:106572. doi: 10.1016/j.rmed.2021.106572. Epub 2021 Aug 13.PMID: 34478992
2. McDonald VM, Gibson PG. Arch Bronconeumol. 2022 Aug;58(8):583-585. doi: 10.1016/j
3. Green RH, et al. Lancet 2002 Nov 30;360(9347):1715-21. doi: 10.1016/S0140-6736(02)11679-5.
4. Hellings P, et al. Rhinology. 2022 Dec 12. doi: 10.4193/Rhin22.344.
5. CFR EUFOREA Paediatric Allergic Rhinitis Pocket Guide 2021
6. CFR EUFOREA Adult Allergic Rhinitis Pocket Guide 2021
7. CFR EUFOREA Chronic Rhinusinusitis Pocket Guide 2023

Key Goals of Asthma Management

- Adequate treatment of asthma, its comorbidities and treatable traits
  - Achieve optimal asthma control (p 22)
  - Need little or no rescue medication
- Achieve (near) normal lung function
- Improve activity and quality of life
- Avoid (severe) exacerbations (risk)
- Prevent lung function decline (long-term risk)
- Stimulate patient engagement through education and self-management support

Prevention: an integral part of asthma management

- Identify, assess and manage adverse effects of CS
  - Use modern CS with optimal therapeutic ratio and less systemic exposure
- Vaccinations against:
  - Influenza, COVID-19, pneumococci
- Allergy-driven symptoms? (p 19)
  - Avoidance/ consider TLA device or AIT*
- Encourage and support smoking cessation
- Improve lifestyle factors (healthy diet/exercise)
- AERD/NERD? Consider desensitisation*
- Allergy driven symptoms? (p 19) - avoidance/consider AIT*

1. GINA 2022
2. Domingo C. Arch Bronconeumol 2013 Apr;49(4):131-4. doi: 10.1016/j.arbres.2012.11.011.
3. EUFOREA Allergic Rhinitis Pocket guide
4. EUFOREA CRS Pocket guide

Asthma Treatment / Management options

Non-pharmacological

All patients

- Patient education/individual (self)management plan
- Inhalation technique instruction and observed dosing; either all DPI or all MDI inhalers
- Lifestyle (smoking cessation, exercise, weight control)
- Environmental control
  - Precipitating triggers (passive smoking, fumes, noxious agents, occupational irritants)
  - Allergen avoidance measures
  - Adequate ventilation

Some patients (specialist referral)

- Consider AIT in individual cases (SLIT) p 19
- Aspirin/NSAID desensitisation
- Temperature-controlled laminar airflow (TLA) device
- Bronchial thermoplasty (BT)

Pharmacological

Controllers

- ICS
- ICS combinations with rapid onset LABA
- LTRA

Bronchodilators (or relievers)

- SABA, LABA, SAMA, LAMA, ultra-LABA, ultra-LAMA
- Combinations
- Dual, triple

Biologics (Specialist care)

- Type 2 targeted
- Anti-IgE (Allergy-driven asthma)
- Anti-IL-5 (Eosinophilic asthma
- Anti-IL4/13 (T2-high asthma, OCS dependent asthma)
- Anti-TSLP (T2-high/non-T2(?) asthma)

Non-type 2 approaches

- Reduce ICS treatment
- Antibiotics (Macrolides)
- Anti-TSLP?

Adverse Effects - Corticosteroids

Corticosteroids constitute the cornerstone of pharmacological treatment in asthma. Inhaled corticosteroids (ICS) in low-medium doses are generally safe, well-tolerated and impose only few (mostly local) side effects. Most patients (specifically those with Type2 (or T2-high) inflammation, will respond to ICS. Local side effects may be reduced by different formulations (pro-drug, small particles) or by using inhalers with lower oropharyngeal deposition or by using inhalation chambers (spacer devices). Systemic side effects can be reduced by ICS formulations with high lung deposition, high first pass metabolism and high serum protein binding.

Short bursts of systemic corticosteroids (SCS) >2x per year already impose clinically relevant risks and should be avoided where possible (consider specialist referral for reassessment diagnosis and/or biologics). Osteoporosis prophylaxis – especially in those at risk – should be prescribed.

Inhaled CS (ICS):
- Oropharyngeal candidiasis
- Dysphonia, hoarseness
- Pharyngitis
- Skin bruising

⚠ Beware systemic adverse effects on high doses of ICS!

Systemic (SCS) and oral CS (OCS):
- Growth retardation
- Suppressed HPA-axis (Cushing syndrome)
- Ocular: glaucoma, cataract
- Brittle skin, bruising, striae
- Diabetes, metabolic syndrome
- Hypertension, cardiovascular events
- Osteoporosis, bone fractures
- Respiratory infections
- Mental/psychiatric symptoms

Side Effects (long-acting) Beta2-agonists

- Tremor
- Palpitations
- May mask airway inflammation resulting in (severe) asthma exacerbations

⚠ **Never use without concomitant ICS!**

Drugs inducing / interfering with Asthma

- Non-selective beta-blockers, (including eyedrops)
- ACE inhibitors
- Aspirin/NSAIDs (in some patients)

When to consider an Inhalation chamber

- Problems with MDI-inhaler coordination
- Inadequate inhalation technique
- To reduce (local) side effects of MDI
- Small airways disease (SAD)
- Provide clear instructions on use and maintenance of spacer device

When to consider allergen-specific immunotherapy (AIT)

- Patients with allergy-driven respiratory disease (allergic asthma +/- AR) not fully controlled by conventional treatment
- Cognitive disturbances related to the allergy
- AR with developing asthma
- Allergies: pollen, HDM

1. Sullivan PW, etal. J Allergy Clin Immunol 2018 Jan;141(1):110-116.e7. doi: 10.1016/j.jaci.2017.04.009.
2. Boulet LP & Godbout K. Am J Respir Crit Care Med 2021; Apr 1;203(7):795-796. doi: 10.1164/rcm.202010-4001ED.
3. Volmer T, et al. Eur Respir J. 2018;52:1800703.
4. Price DB, et al. J Asthma Allergy. 2018;11:193–204.
5. GINA 2022.
6. Diamant Z, et al. Respir Med 2023 (+ references therein).

Monitoring (pp 4-5; 22)

- Assess **Asthma Control** (PROMs: ACQ/ACT)
- Measure **Lung function (i**nitially after 3 months; once yearly at follow-up)
- Discuss **satisfaction/expectations/goals/action plan**

If CONTROLLED:	→ continue/adjust treatment and monitoring
If **PARTIALLY CONTROLLED:**	→ Adjust treatment → Reassess after 2-4 weeks
If UNCONTROLLED:	→ Perform **inflammometry** → Measure **lung function** → Check and **discuss adherence** → Observe and correct **inhalation technique** → Discuss and manage **adverse effects** → Assess **TTs/comorbidities** • Pay special attention to **upper airways** • Environmental **factors/triggers** • **Lifestyle** **Reconsider diagnosis/refer to specialist**

PROMs

Patient-reported outcome measures (PROMs) consist of standardised questionnaires which reflect disease burden or disease impact experienced by individual patients. Currently there are several validated questionnaires for asthma, COPD as well as rhinitis and CRS.

Recommended questionnaire which can be self-administered to assess asthma control and to guide (step-up or step-down of) treatment in patients >11 years:

ACQ5
- Evaluates asthma over last 1 week; time to complete: 3 mins.
- Consists of 5 domains (questions): each domain has a 7-point scale: 0=no impairment – 6=maximal impairment. The ACQ5 score is the mean score of the 5 questions.
- Interpretation: ≤0.75: well-controlled; ≥1.5: not well-controlled; ≥4: poorly controlled (severe exacerbations).
- ACQ6 and 7 add questions on beta-2 use and lung function, resp.

ACT
- Evaluates asthma control over last 4 weeks; time to complete:
- 2 mins.
- Consists of 5 domains (questions); each question has a 5-points range: 1 (worst) – 5 (best). The ACT score is the sum of all scores.
- Interpretation: for adults: ≥20: well-controlled; 19-15: not well-controlled; ≤14: poorly controlled.

Other PROMs/questionnaires for general use:
- **(mini)AQLQ**: evaluates QoL in adult patients
- **CARAT:** evaluates allergic rhinitis and asthma control

1. GINA 2022
2. Reddel HK, et al. AJRCCM 2009 Jul 1;180(1):59-99. doi: 10.1164/rccm.200801-060ST.
3. Kocks JWH, et al. Curr Opin Pulm Med. 2018 Jan;24(1):18-23. doi: 10.1097/MCP.0000000000000447.PMID: 29084018.
4. Juniper EF. et al. 2006 Apr;100(4):616-21. doi: 10.1016/j.rmed.2005.08.012.
5. Nathan RA, et al. J Allergy Clin Immunol 2004 Jan;113(1):59-65. doi: 10.1016/j.jaci.2003.09.008.

Practical Assessments of Asthma Control

Short term	
Symptom control	ACQ5 ≤0.75, ACT>20 (well-controlled)
Normal lung function	FEV1 ≥80% predicted FEV1/FVC ≥0.75
No/reduced hyperresponsiveness	mannitol PD15 >635 mg methacholine PD20 >400 mcg methacholine PC20 >8 mg/mL exercise EIB (FEV1) <10%
No/reduced inflammation	FeNO <25 ppb blood eosinophils <150 cells/µL
Long term	
Exacerbations	no severe exacerbations* in last 12 months
No accelerated lung function decline	post-bronchodilator FEV1-decline ≤30 mL/y post-bronchodilator FVC decline ≤25 mL/y
Overall	
A productive and active life	Good HRQoL, e.g. measured by (mini)AQLQ

*) requiring OCS burst and/or hospitalisation

When to consider specialist referral? (p 24)

- Asthma is suspected but difficult to confirm by spirometry
- When AIT or TLA is considered in allergen-driven respiratory disease (asthma +/- AR) with confirmed allergy
- When treatment with biologics or BT is considered
- In case of suspected comorbidities or co-existing conditions, e.g.:
  - CRSwNP or CRSsNP and/or AERD/NERD
  - VCD, EILO or dysfunctional breathing
  - Obstructive sleep apnoea (OSA)
  - Food allergy or anaphylaxis
  - Recurrent airway infections/bronchiectasis
- Patient requires frequent urgent healthcare utilisation
- Patient needs frequent bursts or maintenance OCS
- Suspected occupational asthma
- Multi(co)morbidities requiring multidisciplinary approach

1. GINA 2022
2. Reddel HK, et al. AJRCCM 2009 Jul 1;180(1):59-99. doi: 10.1164/rccm.200801-060ST.
3. Kocks JWH, et al. Curr Opin Pulm Med. 2018 Jan;24(1):18-23. doi: 10.1097/MCP.0000000000000447.PMID: 29084018.
4. Juniper EF. et al. Respir Med 2006 Apr;100(4):616-21. doi: 10.1016/j.rmed.2005.08.012.
5. Nathan RA, et al. J Allergy Clin Immunol 2004 Jan;113(1):59-65. doi: 10.1016/j.jaci.2003.09.008.
6. Juniper EF, et al. Eur Respir J 1999; 14:32-38. doi: 10.1034/j.1399-3003.1999.14a08.x.

Referrals & Responsibilities

(Depends on local practice and national infrastructure)

General practitioner

- Initiation and coordination of the treatment and referrals

Pulmonologist

- Persistent symptoms +/- frequent severe exacerbations despite good adherence/inhalation technique
- OCS dependency/biologics treatment
- Differential diagnostics, e.g. other respiratory symptoms (phlegm infections)

Ear Nose Throat (ENT) specialist

- Persistent CRS symptoms +/- loss of smell (suspected nasal polyps)
- Suspected OSA
- EILO

Speech therapist / Physiotherapist

- Dysfunctional breathing
- Suspected VCD

Allergist/ Clinical immunologist/Occupational medicine specialist

- Suspected immunodeficiencies/EGPA
- Diagnosis/management of respiratory +/- food allergies/AIT
- Work- or hobby-aggravated symptoms

Dermatologist

- Comorbid atopic dermatitis

Dietician

Dietary intake advise/personal plan

Clinical Psychologist/Psychiatrist

- Functional disorders
- Depression

Surgeon

- Bariatric surgery

Multidisciplinary team

- Could include any of the above

This Asthma Pocket Guide has been authored by Zuzana Diamant and Leif Bjermer, with input from the Asthma Expert Panel and the board members of EUFOREA.

Algorithm on Asthma Diagnosis and Management

Patient education & engagement; Monitoring of Adherence, Inhalation technique, Asthma Control, Comorbidities, TTs, Adverse effects treatment, Lung function

Avoidance of Environmental / occupational Triggers, Tobacco smoke, Allergens; Encouragement of healthy life style; Provide Vaccinations (influenza, COVID-19, Pneumococci

First Line Care
General practitioner/asthma nurse

Second Line Care
Specialist

Asthma confirmed
"Easy to control"

Confirm asthma diagnosis
- Treat with ICS+/-SABA or ICS +/-fast-onset LABA
- Teach inhalation technique
- Identify and treat comorbidities
- Allergen-driven asthma +/- AR? consider AIT!

At followup:
Continue treatment;
Consider to step down (or up)

Asthma
"Difficult to control"

- **Check** adherence/inhalation technique
- **Define** inflammatory phenotype
- **Identify** comorbidities/Treatable traits
- **Manage** environmental triggers /lifestyle factors (smoking/ occupational/allergies: AIT?)
- **Treat** small airways
- **Adjust** medical treatment

Severe Asthma

Allergic asthma
(avoidance, TLA, anti-IgE)

Eosinophilic asthma
(anti-IL5, anti-TSLP?)

T2-driven asthma
(anti IL4/13, anti-TSLP?)

T2-low asthma (EBT, anti-TSLP?)

Comorbidities/ Treatable Traits

Identify and treat comorbidities and TTs:
Allergic rhinitis, Rhinosinusitis (CRSsNP/CRSwNP), AERD/NERD, Atopic Dermatis, COPD, ACO, Bronchiectasis, OSA, Dysfunctional breathing, Psychological dysfunction, Obesity, GERD Primary Care/Pharmacist

PATIENT PARTICIPATION IN TREATMENT PLAN

List of abbreviations

ABPA	allergic bronchopulmonary aspergillosis
AERD	aspirin-exacerbated respiratory disease
A(S)IT	allergen-(specific) immunotherapy
ACO	asthma-COPD overlap syndrome
ACT	asthma control test
ACQ	asthma control questionnaire
AQLQ	asthma quality of life questionnaire
AR	allergic rhinitis
BMI	body mass index
CalvNO	concentration of alveolar nitric oxide
CARAT	control of allergic rhinitis and asthma test
COPD	chronic obstructive pulmonary disease
CRSs/wNP	chronic rhinosinusitis without (s) or with (w) nasal polyps
CS	corticosteroids
CT	computerised tomography
DLCO	diffusing capacity for carbon monoxide
DPI	dry powder inhaler
EILO	exercise-induced laryngeal obstruction
FeNO	fractional exhaled nitric oxide
FEV1	forced expiratory volume in 1 second
GERD	gastroesophageal reflux disease
HDM	house dust mite
HRQoL	health related quality of life
ICS	inhaled corticosteroids
IOS	impulse oscillometry
LABA	long-acting beta agonist
LAMA	long-acting muscarinic antagonist
LLN	low limit of normal
LTRA	leukotriene receptor antagonist
MBW	multiple breath washout
MDI	metered dose inhaler
NSAID(s)	nonsteroidal anti-inflammatory drugs
NERD	NSAIDs exacerbated respiratory disease
OCS	oral corticosteroids
OSA	obstructive sleep apnoea

List of abbreviations (continued)

PC15,20	provocative concentration causing a fall in FEV1 of 15 or 20%, respectively from baseline
PD15,20	provocative dose causing a fall of 15/20% from baseline
PEF	peak expiratory flow
PROMs	patient reported outcomes measures
QoL	quality of life
SABA	short-acting beta agonist
SAD	small airways disease
SAMA	short-acting muscarinic antagonist
SCS	systemic corticosteroids
SLIT	sublingual immunotherapy
TLA	temperature-controlled laminar airflow
VCD	vocal cord dysfunction

Vision

EUFOREA is an international non-profit organization forming an alliance of all stakeholders dedicated to reducing the prevalence and burden of chronic respiratory diseases through the implementation of optimal patient care via education, research and advocacy.

Mission

Based on its medical and scientific core competency, EUFOREA offers a platform to introduce innovation and education in healthcare leading to optimal patient care.

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