

Asthma

Triggers

- allergens: pets, pollen, dust mites
- cold air
- emotion
- smoking
- viral infection
- pollution
- drugs: NSAIDs/BBs

Diagnostic test results

- FEV₁:FVC <70%
- PEF >20% variability
- BDR: FEV₁ ≥12% improvement or ≥200ml volume increase
- FeNO >40ppb

Key elements of diagnosis

- History** – variable symptoms, triggers, PHx or FHx of atopy
- Examination** – wheeze
- Spirometry** – bronchodilator reversibility
- Response to trial of Tx**

NO = produced in response to inflammation

Severe attack	Life-threatening attack
<ul style="list-style-type: none"> incomplete sentences accessory muscles hyperinflated chest pulsus paradoxus* 	<ul style="list-style-type: none"> exhaustion/confusion silent chest cyanosis
<ul style="list-style-type: none"> PEF 33–50% of best RR ≥25 HR ≥110 	<ul style="list-style-type: none"> PEF <33% of best spO₂ <92% ↓HR & ↓BP
*↓SBP with inspiration	ABG: ↑CO ₂ , O ₂ <8, low pH

Parasympathetic action: ACh → M₃ receptors

= bronchoconstriction & ↑mucus

Sympathetic action: adrenaline → β₂ receptors

= bronchodilation & ↓mucus

Chronic, reversible increases in airway resistance due to **bronchospasm, inflammation & mucus production**

Pathophysiology

Triggers activate mast cells to release spasmogens & chemotaxins:

- Early phase:** bronchospasm (**spasmogens**: histamine, PGs, leukotrienes)
- Late phase:** inflammation (**chemotaxins**: attract eosinophils/monocytes)

Types

- Extrinsic:** type 1 hypersensitivity reaction (↑ IgE ± other atopies)
 - early onset/younger patients (may improve with age)
 - in adults = **OCCUPATIONAL ASTHMA**: chemicals, enzymes in flour, animal substances
- Intrinsic:** non-immune mechanisms (often no cause identified)
 - late onset/middle-aged patients

Symptoms

- Wheeze, SOB, cough – worse at night/early morning/on exercise
- Chest tightness

Investigations

- Hx:** FHx/PHx of atopies, typical Sx with diurnal variation, identifiable trigger
- Auscultation:** expiratory polyphonic wheeze
- Blood eosinophils** (± atopy tests: skin prick/serum IgE)
- FeNO test (fraction of expired NO)** – if still unsure of Dx in kids **or** if >17y
- Spirometry + bronchodilator reversibility test** (BDR)
- PEF:** monitor variability over 2–4w
- Direct bronchial challenge:** last resort

Management of acute asthma (adults)⁶

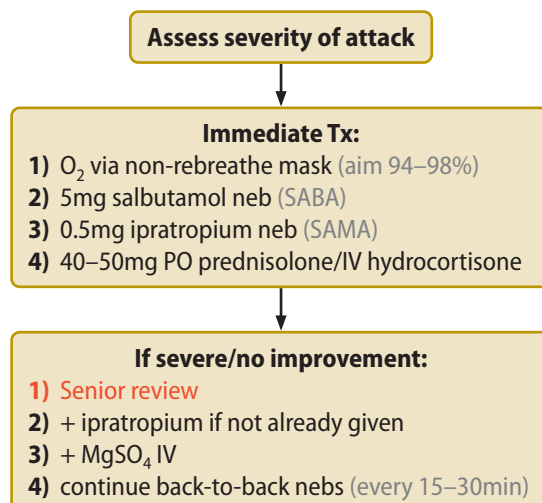


Fig. 9.4

⁶NICE CKS – Clinical scenario: Acute exacerbation of asthma

Management of chronic asthma⁷

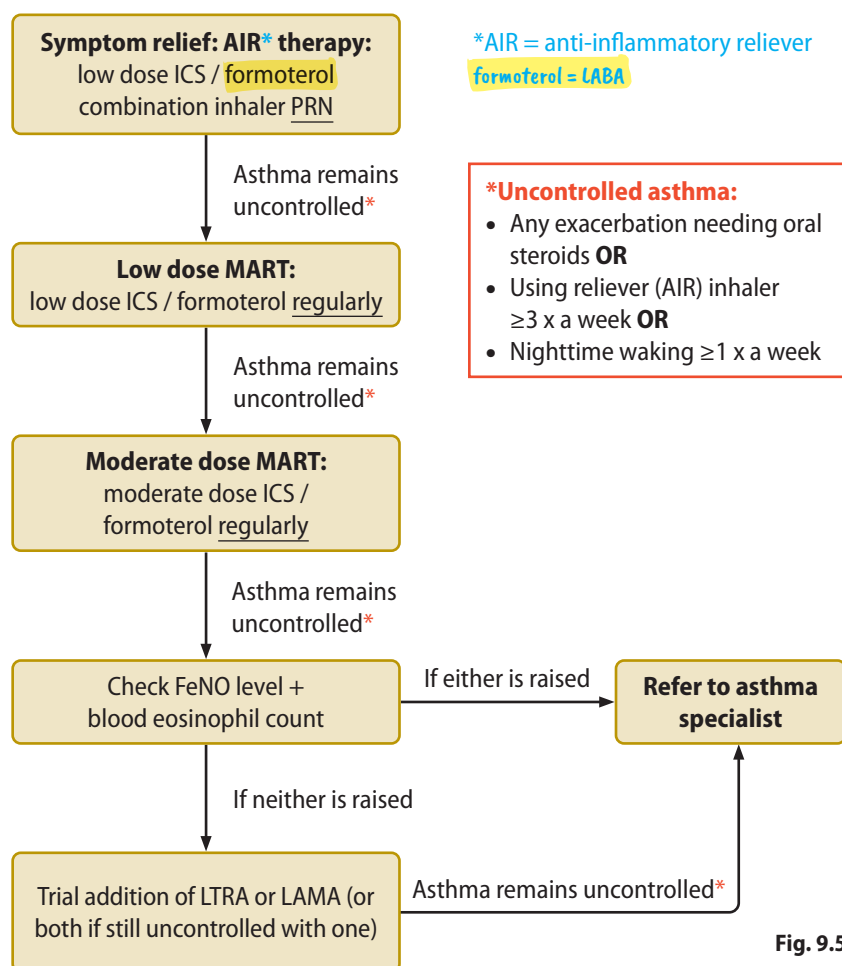


Fig. 9.5

OTHER FACTORS TO CONSIDER:

1. Lifestyle: smoking, weight loss, breathing exercises
2. Inhaler technique & adherence: spacer, add-ons
3. Safety-net: including signs & Mx of acute attack
4. Follow-up appointment: annual review with practice nurse

Safety-netting

SEEK MEDICAL ATTENTION IF:

- Symptoms are getting worse/interfere with daily life
- Waking up at night

SIGNS OF AN ACUTE ATTACK:

- Reliever inhaler isn't helping
- Too breathless to speak/eat/sleep
- Very tight chest/ coughing a lot
- RR increasing/ feel like can't get enough air

Medications

1. Beta-2 agonists (SABA/LABA)

- Beta-2 selective → relaxes smooth muscle in lungs

SE = tachycardia, muscle cramps/tremors

2. Inhaled corticosteroids

- ↑ lipocortin → inhibits PLA_2
- reduced arachidonic acid conversion to LTs/PGs
- ↓ inflammation

SE = oral candidiasis (rinse mouth)

3. Leukotriene receptor antagonists (LTRAs)

- ↓ bronchoconstriction & mucus
- ↓ eosinophils & inflammation

SE = GI upset, headache, hepatic disorder, Churg–Strauss syndrome (vessel inflammation)

For patients still using treatment based on previous guidelines, consider switching therapy to the corresponding step in the latest recommended pathway

Components of an asthma review

- Level of control – poor control suggested if:
 - ▶ using reliever inhaler $> 3 \times$ per week
 - ▶ night symptoms
 - ▶ interfering with activities
 - ▶ chest tightness, wheeze
- Any exacerbations
- Compliance/technique
- Side-effects of medications

What to do in an asthma attack

- Sit up straight
- Puff of PRN inhaler – up to 10 times
- If no improvement call 999

⁷NICE (2024) Asthma pathway (BTS, NICE, SIGN) [NG244]