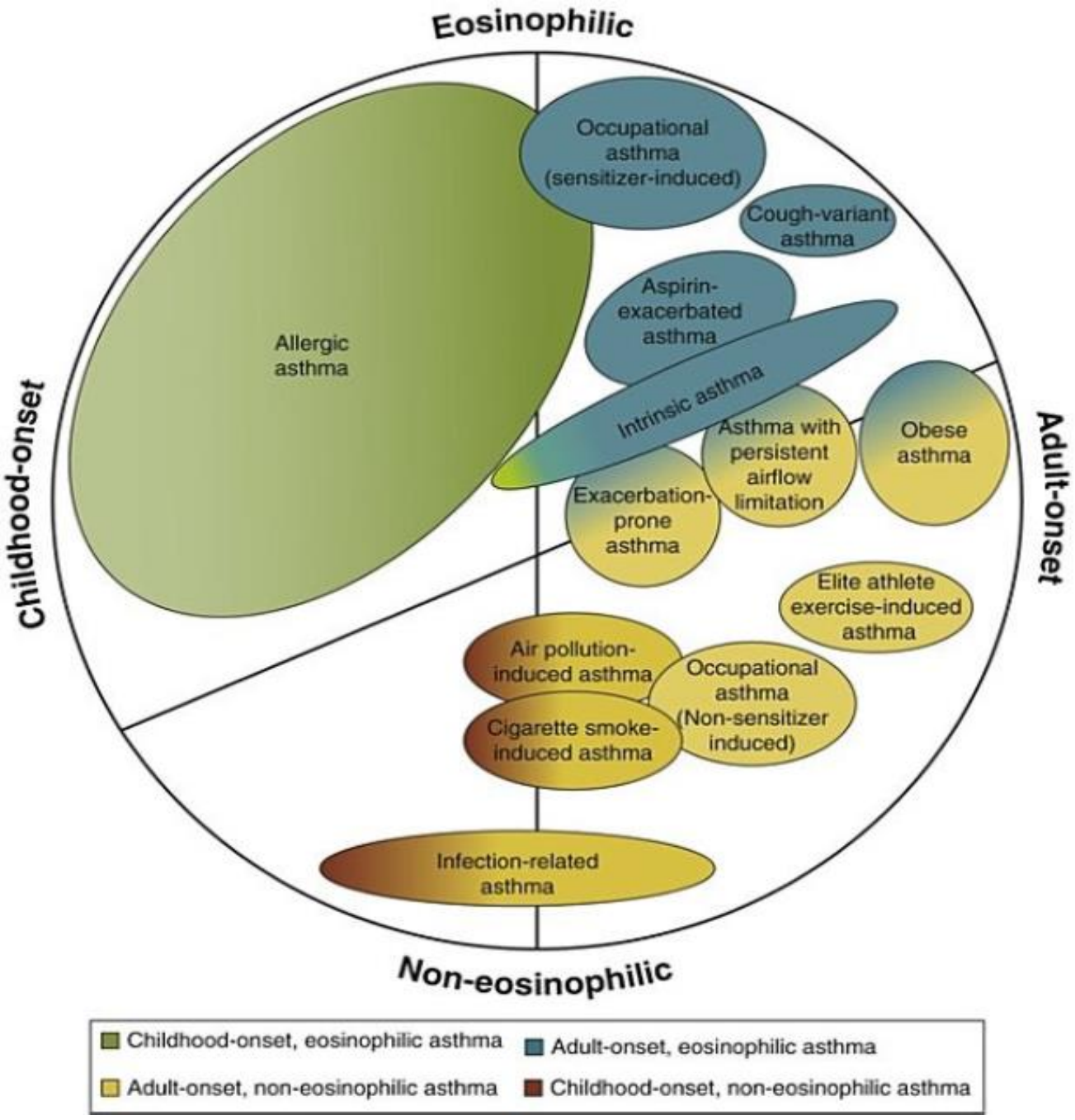
بسم الله الرحمن الرحیم
عبدالله

# Update on Asthma Management

**Mohammad Reza Fazlollahi, MD**
**Associate professor of**
**Immunology, Asthma and Allergy Research Institute**
**Tehran University of Medical Sciences**
**2022**

- Asthma is a complex disease with many phenotypic features but with common characteristics of airway hyperresponsiveness, airway inflammation, and variable airflow obstruction.
- From available evidence, a central phenotype of reversible airflow obstruction, BHR, and mucus hypersecretion defines a core asthma phenotype
- A new approach to medicine is personalized, stratified, or precisional medicine


Eosinophilic
Childhood-onset
Adult-onset
Non-eosinophilic
Allergic asthma
Occupational asthma (sensitizer-induced)
Cough-variant asthma
Aspirin-exacerbated asthma
Intrinsic asthma
Asthma with persistent airflow limitation
Obese asthma
Exacerbation-prone asthma
Elite athlete exercise-induced asthma
Air pollution-induced asthma
Occupational asthma (Non-sensitizer induced)
Cigarette smoke-induced asthma
Infection-related asthma
Childhood-onset, eosinophilic asthma
Adult-onset, eosinophilic asthma
Adult-onset, non-eosinophilic asthma
Childhood-onset, non-eosinophilic asthma

# Asthma Control
# Proactive vs. Reactive

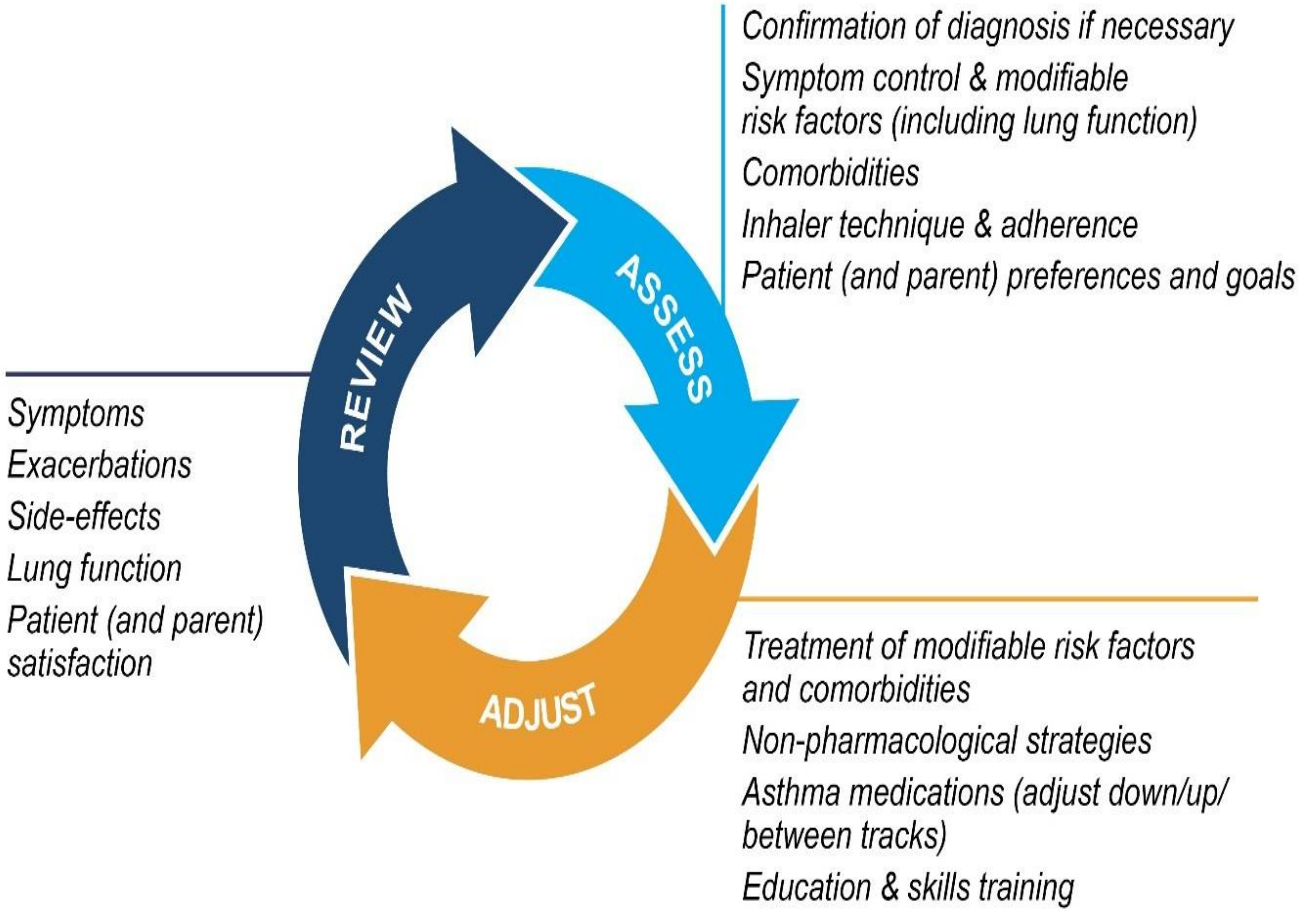
- **Going from a *reactive* to a *proactive* approach**
  - ✓**Instead of thinking-**
    - " *How do I treat these symptoms?"*
      - ➔e.g. with salbutamol after the fact
  - ✓**Think-**
    - " *How could have the symptoms have been prevented in the first place?"*
      - ➔e.g. daily controller medications, pre-exercise meds, asthma action plan, environmental control

# Guidelines

- National Asthma Education and Prevention Program (NAEPP ۲۰۲۰)

- Global Initiative for Asthma (GINA ۲۰۲۱)

# Personalized asthma management




- NOT just about medications, NOT one-size-fits-all

# Assessment of asthma

1. Asthma control - two domains
   - Assess symptom control over the last 4 weeks(Poor symptom control is also strongly associated with an increased risk of asthma exacerbations)
   - Assess risk factors for poor outcomes, including low lung function
2. Assess treatment issues
   - Document the patient's current treatment step
   - Check inhaler technique and adherence
   - Ask about side-effects
   - Does the patient have a written asthma action plan?
   - What are the patient's attitudes and goals for their asthma?
3. Comorbidities
   - Think of rhinosinusitis, GERD, obesity, obstructive sleep apnea, depression, anxiety
   - These may contribute to symptoms and poor quality of life

© Global Initiative for Asthma

- If the term ‘asthma control’ is used with patients, the meaning should always be explained.
- Directed questioning is important.
- A person with a sedentary lifestyle may not experience bothersome symptoms and so may appear to have good symptom control.
- In children, as in adults, assessment of asthma symptom control is based on symptoms, limitation of activities and use of rescue medication

© Global Initiative for Asthma

# GINA assessment of symptom control in adults, adolescents and children 6–11 years

| A. Symptom control | | Level of asthma symptom control | | |
|---|---|---|---|---|
| **In the past 4 weeks, has the patient had:** | | **Well-controlled** | **Partly controlled** | **Uncontrolled** |
| • Daytime asthma symptoms more than twice a week? | Yes❑ No❑ | None of these | 1-2 of these | 3-4 of these |
| • Any night waking due to asthma? | Yes❑ No❑ | | | |
| • Reliever needed for symptoms* more than twice a week? | Yes❑ No❑ | | | |
| • Any activity limitation due to asthma? | Yes❑ No❑ | | | |

*Excludes reliever taken before exercise, because many people take this routinely

© Global Initiative for Asthma

# GINA assessment of asthma control in children ≤5 years

## A. Symptom control

**In the past 4 weeks, has the child had:**

- Daytime asthma symptoms for more than few minutes, more than once/week? Yes❑ No❑
- Any activity limitation due to asthma? (runs/plays less than other children, tires easily during walks/playing) Yes❑ No❑
- Reliever needed* more than once a week? Yes❑ No❑
- Any night waking or night coughing due to asthma? Yes❑ No❑

**Level of asthma symptom control**

| Well-controlled | Partly controlled | Uncontrolled |
|---|---|---|
| None of these | 1-2 of these | 3-4 of these |

## B. Risk factors for poor asthma outcomes

**ASSESS CHILD'S RISK FOR:**

- Exacerbations within the next few months
- Fixed airflow limitation
- Medication side-effects

© Global Initiative for Asthma

# GINA assessment of asthma control

## A. Symptom control

**In the past 4 weeks, has the patient had:**

- Daytime asthma symptoms more than twice a week? Yes❑ No❑
- Any night waking due to asthma? Yes❑ No❑
- Reliever needed for symptoms* more than twice a week? Yes❑ No❑
- Any activity limitation due to asthma? Yes❑ No❑

**Level of asthma symptom control**

| Well-controlled | Partly controlled | Uncontrolled |
|---|---|---|
| None of these | 1-2 of these | 3-4 of these |

## B. Risk factors for poor asthma outcomes

- Assess risk factors at diagnosis and periodically
- Measure $FEV_1$ at start of treatment, after 3 to 6 months of treatment to record the patient's personal best, then periodically for ongoing risk assessment

**ASSESS PATIENT'S RISKS FOR:**

- Exacerbations
- Fixed airflow limitation
- Medication side-effects

© Global Initiative for Asthma

# Risk factors

Having any of these risk factors increases the patient's risk of exacerbations even if they have few asthma symptoms

- Medications: High SABA use (with increased mortality if >1 x 200-dose canister/month)
- Inadequate ICS: not prescribed ICS; poor adherence; incorrect inhaler technique
- Comorbidities: obesity; chronic rhinosinusitis; confirmed food allergy; pregnancy
- Exposures: smoking; allergen exposure if sensitized; air pollution.
- Context: Major psychological or socioeconomic problems

- Lung function: low FEV1, especially <60% predicted, high bronchodilator reversibility
- Other tests in patients with Type 2 inflammation: blood eosinophils;; elevated FENO (in adults with allergic asthma taking ICS)

- Other major independent risk factors for flare-ups (exacerbations)
- • Ever intubated or in intensive care unit for asthma
- • ≥1 severe exacerbation in last 12 months

© Global Initiative for Asthma

# Risk factors for poor asthma outcomes in children ≤5 years

## Risk factors for exacerbations in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in previous year
- The start of the child's usual 'flare-up' season (especially if autumn/fall)
- Exposures: tobacco smoke; indoor or outdoor air pollution; indoor allergens (e.g. house dust mite, cockroach, pets, mold), especially in combination with viral infection
- Major psychological or socio-economic problems for child or family
- Poor adherence with controller medication, or incorrect inhaler technique

## Risk factors for fixed airflow limitation

- Severe asthma with several hospitalizations
- History of bronchiolitis

## Risk factors for medication side-effects

- Systemic: Frequent courses of OCS; high-dose and/or potent ICS
- Local: moderate/high-dose or potent ICS; incorrect inhaler technique; failure to protect skin or eyes when using ICS by nebulizer or spacer with face mask

© Global Initiative for Asthma

# Background to changes in 2019 - the risks of ‘mild’ asthma

- Patients with apparently mild asthma are at risk of serious adverse events
  - 30–37% of adults with acute asthma
  - 16% of patients with near-fatal asthma
  - 15–20% of adults dying of asthma

  had symptoms less than weekly in previous 3 months *(Dusser, Allergy 2007)*
- Exacerbation triggers are variable (viruses, pollens, pollution, poor adherence)
- Inhaled SABA has been first-line treatment for asthma for 50 years
  - This dates from an era when asthma was thought to be a disease of bronchoconstriction
  - Patient satisfaction with, and reliance on, SABA treatment is reinforced by its rapid relief of symptoms, its prominence in ED and hospital management of exacerbations, and low cost
  - Patients commonly believe that *“My reliever gives me control over my asthma”*, so they often don’t see the need for additional treatment

© Global Initiative for Asthma

# Background to changes in 2019 - the risks of SABA-only treatment

- Regular or frequent use of SABA is associated with adverse effects
  - β-receptor downregulation, decreased bronchoprotection, rebound hyperresponsiveness, decreased bronchodilator response *(Hancox, Respir Med 2000)*
  - Increased allergic response, and increased eosinophilic airway inflammation *(Aldridge, AJRCCM 2000)*
- Higher use of SABA is associated with adverse clinical outcomes
  - Dispensing of ≥3 canisters per year (average 1.7 puffs/day) is associated with higher risk of emergency department presentations *(Stanford, AAAI 2012)*
  - Dispensing of ≥12 canisters per year is associated with higher risk of death *(Suissa, AJRCCM 1994)*

© Global Initiative for Asthma

# GINA 2019 – landmark changes in asthma management

- For safety, GINA no longer recommends SABA-only treatment for Step 1 in adults and adolescents
  - This decision was based on evidence that SABA-only treatment increases the risk of severe exacerbations, and that adding any ICS significantly reduces the risk
- GINA now recommends that all adults and adolescents with asthma should receive ICS-containing controller treatment, to reduce the risk of serious exacerbations
  - The ICS can be delivered by regular daily treatment or, in mild asthma, by as-needed low dose ICS-formoterol
- This is a population-level risk reduction strategy
  - Other examples: statins, anti-hypertensives
  - The aim is to reduce the probability of serious adverse outcomes at a population level
  - Individual patients may not necessarily experience (or be aware of) short-term clinical benefit

ICS: inhaled corticosteroids; SABA: short-acting beta$_2$-agonist

© Global Initiative for Asthma

# STARTING ASTHMA TREATMENT

- ICS-containing treatment should be initiated as soon as possible after the diagnosis of asthma is made because :
- Patients with even mild asthma can have severe exacerbations
- Low dose ICS markedly reduces asthma hospitalizations and death
- Low dose ICS is very effective in preventing severe exacerbations, reducing symptoms, improving lung function, and preventing exercise- induced bronchoconstriction, even in patients with mild asthma
- •Patients not taking ICS who experience a severe exacerbation have lower long-term lung function than those who have started ICS
- In occupational asthma, early removal from exposure and early treatment increase the probability of recovery

© Global Initiative for Asthma

# STARTING TREATMENT

## STARTING TREATMENT
### in adults and adolescents with a diagnosis of asthma

*Track 1 is preferred if the patient is likely to be poorly adherent with daily controller ICS-containing therapy is recommended even if symptoms are infrequent, as it reduces the risk of severe exacerbations and need for OCS.*

**FIRST ASSESS:**

- Confirm diagnosis
- Symptom control and modifiable risk factors, including lung function
- Comorbidities
- Inhaler technique and adherence
- Patient preferences and goals

**START HERE IF:**

**CONTROLLER** and **PREFERRED RELIEVER** (Track 1). Using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever

Symptoms less than 4–5 days a week

Symptoms most days, or waking with asthma once a week or more

Daily symptoms, or waking with asthma once a week or more, and low lung function

*Short course OCS may also be needed for patients presenting with severely uncontrolled asthma*

**STEPS 1 – 2**
As-needed low dose ICS-formoterol

**STEP 3**
Low dose maintenance ICS-formoterol

**STEP 4**
Medium dose maintenance ICS-formoterol

**STEP 5**
Add-on LAMA
Refer for phenotypic assessment ± anti-IgE, anti-IL5/5R, anti-IL4R
Consider high dose ICS-formoterol

RELIEVER: As-needed low-dose ICS-formoterol

**START HERE IF:**

**CONTROLLER** and **ALTERNATIVE RELIEVER** (Track 2). Before considering a regimen with SABA reliever, check if the patient is likely to be adherent with daily controller therapy

Symptoms less than twice a month

Symptoms twice a month or more, but less than 4–5 days a week

Symptoms most days, or waking with asthma once a week or more

Daily symptoms, or waking with asthma once a week or more, and low lung function

*Short course OCS may also be needed for patients presenting with severely uncontrolled asthma*

**STEP 1**
Take ICS whenever SABA taken

**STEP 2**
Low dose maintenance ICS

**STEP 3**
Low dose maintenance ICS-LABA

**STEP 4**
Medium/high dose maintenance ICS-LABA

**STEP 5**
Add-on LAMA
Refer for phenotypic assessment ± anti-IgE, anti-IL5/5R, anti-IL4R
Consider high dose ICS-LABA

RELIEVER: As-needed short-acting β2-agonist

© Global Initiative for Asthma

# Selecting initial controller treatment in children aged 6–11 years with a diagnosis of asthma

## STARTING TREATMENT

**Children 6–11 years with a diagnosis of asthma**

**ASSESS:**

- Confirmation of diagnosis
- Symptom control & modifiable risk factors (including lung function)
- Comorbidities
- Inhaler technique & adherence
- Child and parent preferences and goals

**START HERE IF:**

- Symptoms less than twice a month
- Symptoms twice a month or more, but less than daily
- Symptoms most days, or waking with asthma once a week or more
- Symptoms most days, or waking with asthma once a week or more, and low lung function

*Short course OCS may also be needed for patients presenting with severely uncontrolled asthma*

| | STEP 1 | STEP 2 | STEP 3 | STEP 4 | STEP 5 |
|---|---|---|---|---|---|
| **PREFERRED CONTROLLER** to prevent exacerbations and control symptoms | Low dose ICS taken whenever SABA taken | Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for children) | Low dose ICS-LABA, OR medium dose ICS, OR very low dose* ICS-formoterol maintenance and reliever (MART) | Medium dose ICS-LABA, OR low dose† ICS-formoterol maintenance and reliever therapy (MART). Refer for expert advice | Refer for phenotypic assessment ± higher dose ICS-LABA or add-on therapy, e.g. anti-IgE |
| *Other controller options* | *Consider daily low dose ICS* | *Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken* | *Low dose ICS + LTRA* | *Add tiotropium or add LTRA* | *Add-on anti-IL5, or add-on low dose OCS, but consider side-effects* |
| **RELIEVER** | *As-needed short-acting beta2-agonist (or low dose ICS-formoterol reliever for MART as above)* | | | | |

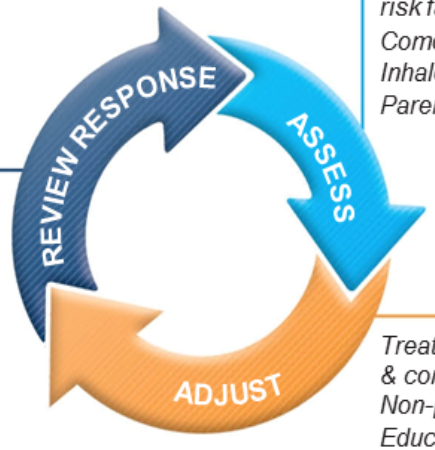
**Very low dose: BUD-FORM 100/6 mcg*
*†Low dose: BUD-FORM 200/6 mcg (metered doses).*

© Global Initiative for Asthma

Box 6-5

## Children 5 years and younger

**Personalized asthma management:**
Assess, Adjust, Review response




*Exclude alternative diagnoses*
*Symptom control & modifiable risk factors*
*Comorbidities*
*Inhaler technique & adherence*
*Parent goals*

*Symptoms*
*Exacerbations*
*Side-effects*
*Parent satisfaction*

*Treat modifiable risk factors & comorbidities*
*Non-pharmacological strategies*
*Education & skills training*
*Asthma medications*

**Asthma medication options:**
Adjust treatment up and down for individual child's needs

| | STEP 1 | STEP 2 | STEP 3 | STEP 4 |
|---|---|---|---|---|
| **PREFERRED CONTROLLER CHOICE** | | Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for pre-school children) | Double 'low dose' ICS | Continue controller & refer for specialist assessment |
| *Other controller options* | | *Leukotriene receptor antagonist (LTRA), or intermittent ICS* (Short courses at onset of respiratory illness) | *Low dose ICS + LTRA Consider specialist referral* | *Add LTRA, or increase ICS frequency, or add intermittent ICS* |
| **RELIEVER** | *As-needed short-acting $\beta_2$-agonist* | | | |
| **CONSIDER THIS STEP FOR CHILDREN WITH:** | Infrequent viral wheezing and no or few interval symptoms | Symptom pattern consistent with asthma, and asthma symptoms not well-controlled or ≥3 exacerbations per year. Symptom pattern not consistent with asthma but wheezing episodes requiring SABA occur frequently, e.g. ≥3 per year. Give diagnostic trial for 3 months. Consider specialist referral. | Asthma diagnosis, and asthma not well-controlled on low dose ICS | Asthma not well-controlled on double ICS |
| | | | Before stepping up, check for alternative diagnosis, check inhaler skills, review adherence and exposures | |

# Low, medium and high ICS doses: adults/adolescents

| Adults and adolescents (12 years and older) | | | |
|---|---|---|---|
| Inhaled corticosteroid | Total daily ICS dose (mcg) | | |
| | Low | Medium | High |
| Beclometasone dipropionate (pMDI, standard particle, HFA) | 200-500 | >500-1000 | >1000 |
| Beclometasone dipropionate (pMDI, extrafine particle*, HFA) | 100–200 | >200–400 | >400 |
| Budesonide (DPI) | 200–400 | >400–800 | >800 |
| Ciclesonide (pMDI, extrafine particle*, HFA) | 80–160 | >160–320 | >320 |
| Fluticasone furoate (DPI) | 100 | | 200 |
| Fluticasone propionate (DPI) | 100–250 | >250–500 | >500 |
| Fluticasone propionate (pMDI, standard particle, HFA) | 100–250 | >250–500 | >500 |
| Mometasone furoate (DPI) | 200 | | 400 |
| Mometasone furoate (pMDI, standard particle, HFA) | 200-400 | | >400 |

This is NOT a table of equivalence. These are suggested total daily doses for the 'low', 'medium' and 'high' dose treatment options with different ICS.

DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant; pMDI: pressurized metered dose inhaler (non-CFC); * see product information

© Global Initiative for Asthma

# Low, medium and high ICS doses: children 6-11 years

| Children 6–11 years | | | |
|---|---|---|---|
| Inhaled corticosteroid | Total daily ICS dose (mcg) | | |
| | Low | Medium | High |
| Beclometasone dipropionate (pMDI, standard particle, HFA) | 100–200 | >200–400 | >400 |
| Beclometasone dipropionate (pMDI, extrafine particle*, HFA) | 50-100 | >100-200 | >200 |
| Budesonide (DPI) | 100–200 | >200–400 | >400 |
| Budesonide (nebules) | 250–500 | >500–1000 | >1000 |
| Ciclesonide (pMDI, extrafine particle*, HFA) | 80 | >80-160 | >160 |
| Fluticasone furoate (DPI) | 50 | | n.a. |
| Fluticasone propionate (DPI) | 50-100 | >100-200 | >200 |
| Fluticasone propionate (pMDI, standard particle, HFA) | 50-100 | >100-200 | >200 |
| Mometasone furoate (pMDI, standard particle, HFA) | 100 | | 200 |

This is NOT a table of equivalence. These are suggested total daily doses for the ‘low’, ‘medium’ and ‘high’ dose treatment options with different ICS.

DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant; pMDI: pressurized metered dose inhaler (non-CFC); * see product information

© Global Initiative for Asthma

# Low, medium and high ICS doses: children 5 years and younger

| Inhaled corticosteroid | Low total daily dose (mcg) (age-group with adequate safety and effectiveness data) |
|---|---|
| BDP (pMDI, standard particle, HFA) | 100 (ages 5 years and older) |
| BDP (pMDI, extrafine particle, HFA) | 50 (ages 5 years and older) |
| Budesonide nebulized | 500 (ages 1 year and older) |
| Fluticasone propionate (pMDI, standard particle, HFA) | 50 (ages 4 years and older) |
| Fluticasone furoate (DPI) | Not sufficiently studied in children 5 years and younger) |
| Mometasone furoate (pMDI, standard particle, HFA) | 100 (ages 5 years and older) |
| Ciclesonide (pMDI, extrafine particle, HFA) | Not sufficiently studied in children 5 years and younger |

This is NOT a table of equivalence. These are suggested total daily doses for the 'low' dose treatment options with different ICS.

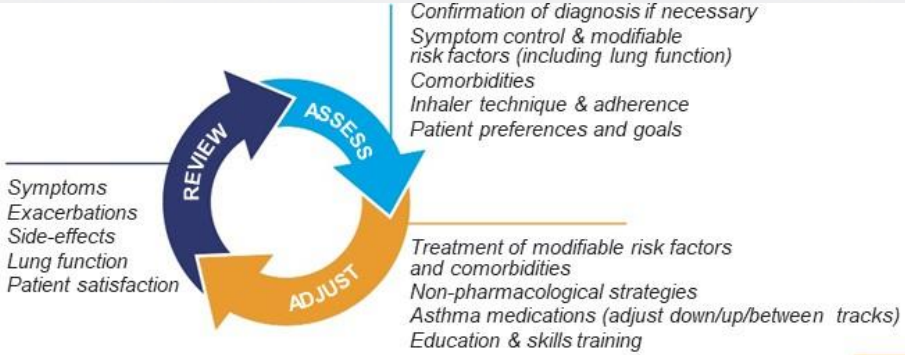
BDP: beclometasone dipropionate; DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant; pMDI: pressurized metered dose inhaler (non-CFC)

© Global Initiative for Asthma

# Personalized management for adults and adolescents to control symptoms and minimize future risk

## Adults & adolescents 12+ years

**Personalized asthma management**
Assess, Adjust, Review
for individual patient needs




| | | | | | |
|---|---|---|---|---|---|
| **CONTROLLER** and **PREFERRED RELIEVER** (Track 1). Using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever | **STEPS 1 – 2** As-needed low dose ICS-formoterol | | **STEP 3** Low dose maintenance ICS-formoterol | **STEP 4** Medium dose maintenance ICS-formoterol | **STEP 5** Add-on LAMA Refer for phenotypic assessment ± anti-IgE, anti-IL5/5R, anti-IL4R Consider high dose ICS-formoterol |
| | RELIEVER: As-needed low-dose ICS-formoterol | | | | |
| **CONTROLLER** and **ALTERNATIVE RELIEVER** (Track 2). Before considering a regimen with SABA reliever, check if the patient is likely to be adherent with daily controller | **STEP 1** Take ICS whenever SABA taken | **STEP 2** Low dose maintenance ICS | **STEP 3** Low dose maintenance ICS-LABA | **STEP 4** Medium/high dose maintenance ICS-LABA | **STEP 5** Add-on LAMA Refer for phenotypic assessment ± anti-IgE, anti-IL5/5R, anti-IL4R Consider high dose ICS-LABA |
| | RELIEVER: As-needed short-acting β2-agonist | | | | |
| Other controller options for either track | | *Low dose ICS whenever SABA taken, or daily LTRA, or add HDM SLIT* | *Medium dose ICS, or add LTRA, or add HDM SLIT* | *Add LAMA or LTRA or HDM SLIT, or switch to high dose ICS* | *Add azithromycin (adults) or LTRA; add low dose OCS but consider side-effects* |

© Global Initiative for Asthma

# NAEPP 2020 Update of the Expert Panel Report 3 Step Therapy Diagram for individuals 12 years of age and older

| Intermittent Asthma | Management of Persistent Asthma in Individuals Ages 12 Years and Older | | | | |
|---|---|---|---|---|---|
| Step 1 | Step 2 | Step 3 | Step 4 | Step 5 | Step 6 |
| *Preferred:*<br>prn SABA | *Preferred:*<br>Daily low-dose ICS and prn SABA<br>***OR***<br>**prn concomitant low-dose ICS and prn SABA**<br>*Alternative:*<br>Daily LTRA and prn SABA | *Preferred:*<br>**Daily and prn low-dose ICS-formoterol (SMART)**<br>*Alternative:*<br>Daily medium-dose ICS and prn SABA<br>*OR*<br>Daily low-dose ICS + LABA or LTRA **or LAMA** and prn SABA | *Preferred:*<br>**Daily and prn medium-dose ICS-formoterol (SMART)**<br>*Alternative:*<br>Daily medium-dose ICS + LABA **or LAMA** or LTRA and prn SABA | *Preferred:*<br>**Daily medium-dose ICS + LABA + LAMA and prn SABA**<br>*Alternative:*<br>Daily high-dose ICS + LABA and prn SABA<br>*OR*<br>Daily high-dose ICS + LTRA and prn SABA | Not in material reviewed by the Expert Panel |

A low or high perception of symptoms may not be good candidates

# Personalized management for children 6–11 years to control symptoms and minimize future risk

## Children 6-11 years

**Personalized asthma management:**
Assess, Adjust, Review

*Confirmation of diagnosis if necessary*
*Symptom control & modifiable risk factors (including lung function)*
*Comorbidities*
*Inhaler technique & adherence*
*Child and parent preferences and goals*

*Symptoms*
*Exacerbations*
*Side-effects*
*Lung function*
*Child and parent satisfaction*

*Treatment of modifiable risk factors & comorbidities*
*Non-pharmacological strategies*
*Asthma medications (adjust down or up)*
*Education & skills training*

**Asthma medication options:**
Adjust treatment up and down for individual child's needs

| | | | | | |
|---|---|---|---|---|---|
| **PREFERRED CONTROLLER** to prevent exacerbations and control symptoms | **STEP 1** Low dose ICS taken whenever SABA taken | **STEP 2** Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for children) | **STEP 3** Low dose ICS-LABA, OR medium dose ICS, OR very low dose* ICS-formoterol maintenance and reliever (MART) | **STEP 4** Medium dose ICS-LABA, OR low dose† ICS-formoterol maintenance and reliever therapy (MART). Refer for expert advice | **STEP 5** Refer for phenotypic assessment ± higher dose ICS-LABA or add-on therapy, e.g. anti-IgE |
| *Other controller options* | *Consider daily low dose ICS* | *Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken* | *Low dose ICS + LTRA* | *Add tiotropium or add LTRA* | *Add-on anti-IL5, or add-on low dose OCS, but consider side-effects* |
| **RELIEVER** | *As-needed short-acting beta2-agonist (or ICS-formoterol reliever for MART as above)* | | | | |

**Very low dose: BUD-FORM 100/6 mcg*
*†Low dose: BUD-FORM 200/6 mcg (metered doses).*

© Global Initiative for Asthma

# Adverse effects with montelukast

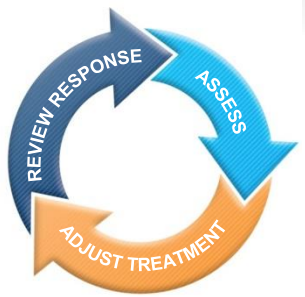
- FDA boxed warning in March 2020 about risk of serious neuropsychiatric events, including suicidality, with montelukast
  - Includes suicidality in adults and adolescents
  - Nightmares and behavioural problems in children
- Before prescribing montelukast, health professionals should consider its benefits and risks, and patients should be counselled about the risk of neuropsychiatric events

**FDA requires Boxed Warning about serious mental health side effects for asthma and allergy drug montelukast (Singulair); advises restricting use for allergic rhinitis**

*Risks may include suicidal thoughts or actions*

© Global Initiative for Asthma

# Reviewing response and adjusting treatment




- How often should asthma be reviewed?
  - 1-3 months after treatment started, then every 3-12 months
  - During pregnancy, every 4-6 weeks
  - After an exacerbation, within 1 week
- Stepping up asthma treatment
  - *Sustained step-up*, for at least 2-3 months if asthma poorly controlled
    - Important: first check for common causes (symptoms not due to asthma, incorrect inhaler technique, poor adherence)
  - *Short-term step-up*, for 1-2 weeks, e.g. with viral infection or allergen
    - May be initiated by patient with written asthma action plan
  - *Day-to-day adjustment*
    - For patients prescribed low-dose ICS/formoterol maintenance and reliever regimen*
- Stepping down asthma treatment
  - Consider step-down after good control maintained for 3 months
  - Find each patient's minimum effective dose, that controls both symptoms and exacerbations

*Approved only for low dose beclometasone/formoterol and low dose budesonide/formoterol

© Global Initiative for Asthma