# Stepwise treatment in asthma

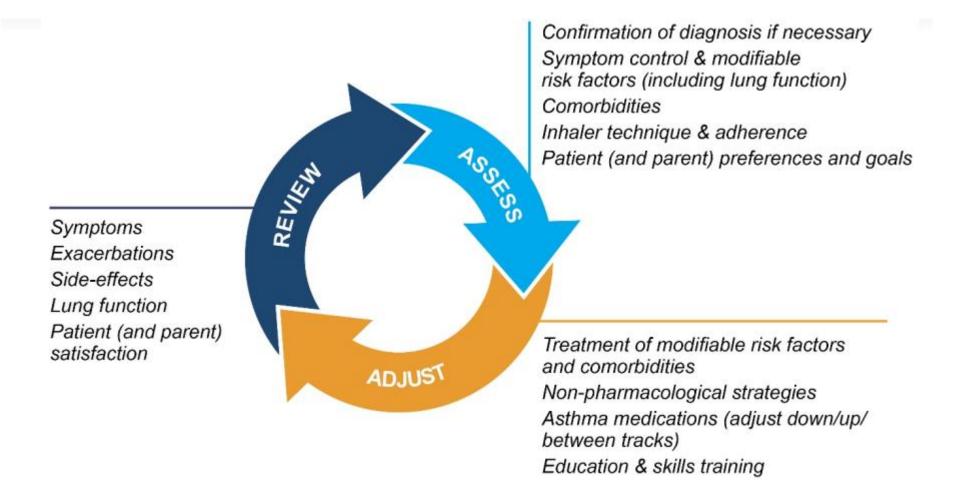
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Allergist& Clinical Immunologist

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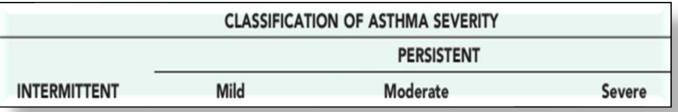


### The control-based asthma management cycle



### Asthma severity:

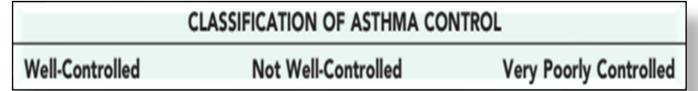
➤ Intrinsic intensity of disease



> Patients not receiving controller therapy

### Asthma control:

➤ Day-to-day variability of an asthmatic patient





### **GINA** assessment of asthma control

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

### B. Risk factors for poor asthma outcomes

- Exacerbations
- Fixed airflow limitation
- Medication side-effects





LEVEL OF CONTROL	TREATMENT OF ACTION
controlled	maintain and find lowest controlling step
partly controlled	consider stepping up to gain control
uncontrolled	step up until controlled
exacerbation	treat as exacerbation

### Stepwise approach for managing asthma in children 5 – 11 years of age

Intermittent **Asthma** 

#### Persistent Asthma: Daily Medication

Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Step 6

Preferred:

corticosteroid

High-dose ICS +

Step up if needed

(first, check adherence. inhaler technique, environmental control, and comorbid conditions)

> A33633 control

Step down if possible

(and asthma is well controlled at least 3 months)

Each step: Patient education, environmental control, and management of comorbidities.

Steps 2-4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

#### Quick-Relief Medication for All Patients

- intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

Step 1

Preferred: SABA PRN Step 2

Preferred:

Low-dose ICS

Alternative:

Cromolyn, LTRA, Nedocromil, or Theophylline

Step 3

Preferred: EITHER:

Low-dose ICS +

either LABA. LTRA, or Theophylline

OR

Medium-dose

Step 4

Preferred:

Medium-dose ICS + LABA

Alternative:

Medium-dose ICS + either LTRA or Theophylline

Step 5

Preferred:

Alternative:

LABA

High-dose ICS +

High-dose ICS +

either LTRA or

Theophylline

High-dose ICS + LABA + oral systemic

Alternative:

either LTRA or Theophylline + oral systemic corticosteroid

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SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute

### Low, medium and high dose inhaled corticosteroids Children 6–11 years

Inhaled corticosteroid	Tota	al daily dose (mcg	g)
	Low	Medium	High
Beclometasone dipropionate (HFA)	50–100	>100–200	>200
Budesonide (DPI)	100–200	>200–400	>400
Budesonide (nebules)	250–500	>500–1000	>1000
Fluticasone propionate (HFA)	100–200	>200–500	>500

### Low, medium and high dose inhaled corticosteroids Adults and adolescents (≥12 years)

Inhaled corticosteroid	Tot	al daily dose (mc	g)
	Low	Medium	High
Beclometasone dipropionate (HFA)	100–200	>200–400	>400
Budesonide (DPI)	200–400	>400–800	>800
Fluticasone propionate (DPI or HFA)	100–250	>250–500	>500



### **Risk Assessment for Corticosteroid Adverse Effects**

	CONDITIONS	RECOMMENDATIONS
Low risk	(≤1 risk factor*) Low- to medium-dose ICS (see Table 169.13)	Monitor blood pressure and weight with each physician visit.  Measure height annually (stadiometry); monitor periodically for declining growth rate and pubertal developmental delay.  Encourage regular physical exercise.  Ensure adequate dietary calcium and vitamin D with additional supplements for daily calcium if needed.  Avoid smoking and alcohol.  Ensure TSH status if patient has history of thyroid abnormality.
Medium risk	(If >1 risk factor,* consider evaluating as high risk) High-dose ICS (see Table 169.13) At least 4 courses of OCS/yr	As above, plus: Yearly ophthalmologic evaluations to monitor for cataracts or glaucoma Baseline bone densitometry (DEXA scan) Consider patient at increased risk for adrenal insufficiency, especially with physiologic stressors (e.g., surgery, accident, significant illness).
High risk	Chronic systemic corticosteroids (>7.5 mg daily or equivalent for >1 mo) ≥7 OCS burst treatments/year Very-high-dose ICS (e.g., fluticasone propionate ≥800 µg/day)	As above, plus:  DEXA scan: if DEXA z score ≤1.0, recommend close monitoring (every 12 mo)  Consider referral to a bone or endocrine specialist.  Bone age assessment  Complete blood count  Serum calcium, phosphorus, and alkaline phosphatase determinations  Urine calcium and creatinine measurements  Measurements of testosterone in males, estradiol in amenorrheic premenopausal women, vitamin D (25-OH and 1,25-OH vitamin D), parathyroid hormone, and osteocalcin  Urine telopeptides for those receiving long-term systemic or frequent OCS treatment  Assume adrenal insufficiency for physiologic stressors (e.g., surgery, accident, significant illness).



### Stepwise approach for managing asthma in children 5 – 11 years of age

Intermittent **Asthma** 

#### Persistent Asthma: Daily Medication

Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

Step up if needed

(first, check adherence, inhaler technique. environmental control, and comorbid conditions)

> A33633 control

Step down if possible

(and asthma is well controlled at least 3 months)

### Step 2

Preferred:

Low-dose ICS

Alternative:

Cromolyn, LTRA, Nedocromil, or Theophylline

### Step 3

Preferred:

EITHER:

Low-dose ICS + either LABA. LTRA, or Theophylline OR

Medium-dose ICS

### Step 4

Preferred:

Medium-dose ICS + LABA

Alternative:

Medium-dose ICS + either LTRA or Theophylline

### Step 5

Preferred:

High-dose ICS + LABA

Alternative:

High-dose ICS + either LTRA or Theophylline

### Step 6

Preferred:

High-dose ICS + LABA + oral systemic corticosteroid

Alternative:

High-dose ICS + either LTRA or Theophylline + oral systemic corticosteroid

SABA PRN

Preferred:

Step 1

Each step: Patient education, environmental control, and management of comorbidities.

Steps 2-4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

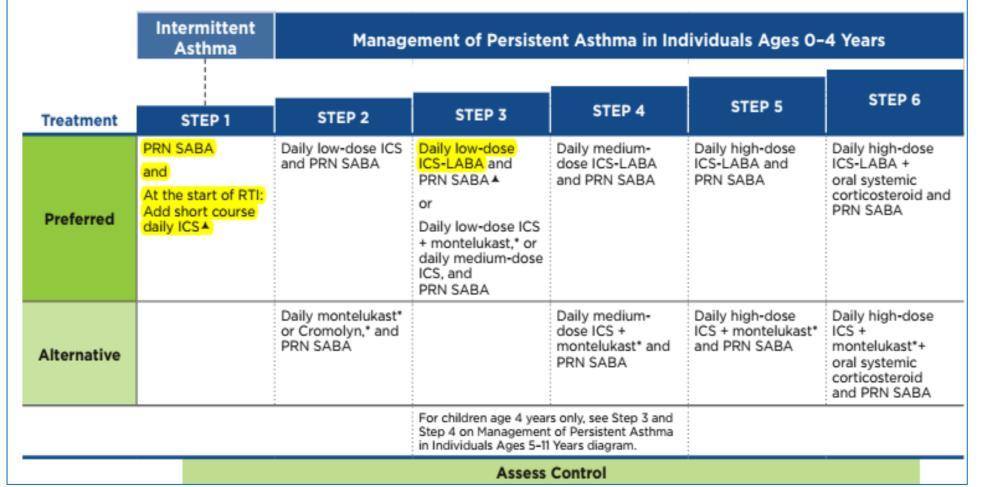
#### Quick-Relief Medication for All Patients

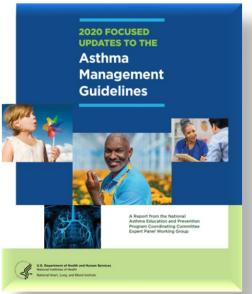
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

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		CLASSIFICAT	ION OF ASTHMA SEVERITY	
			PERSISTENT	
	INTERMITTENT	Mild	Moderate	Severe
COMPONENTS OF SEV	ERITY			
Impairment				
Daytime symptoms Nighttime awakenings:	≤2 days/wk	>2 days/wk but not daily	Daily	Throughout the day
Age 0-4 yr	0	1-2x/mo	3-4×/mo	>1x/wk
Age ≥5 yr	≤2×/mo	3-4×/mo	>1×/wk but not nightly	Often 7×/wk
Short-acting β <sub>2</sub> -agonist use for symptoms (not for EIB prevention)	≤2 days/wk	>2 days/wk but not daily, and not more than 1× on any day	Daily	Several times per day
Interference with normal activity	None	Minor limitation	Some limitation	Extreme limitation
Lung function: FEV₁ % predicted, age ≥5 yr	Normal FEV <sub>1</sub> between exacerbations >80% predicted	≥80% predicted	60–80% predicted	<60% predicted
FEV,/FVC ratio <sup>†</sup> :	200% predicted			
Age 5-11 yr	>85%	>80%	75-80%	<75%
Age ≥12 yr	Normal	Normal	Reduced 5%	Reduced >5%
Frequency and severity n Relative annual risk of ex	0-1/yr (see notes) 0-1/yr (see notes) terval since last exacerbationsy fluctuate over time for acerbations may be relate	≥2/yr (see notes) ion. r patients in any severity ca ed to FEV₁.	lasting >1 day and risk factors for ≥2/yr (see notes)	persistent asthma ≥2/yr (see notes)
(See Table 169.11 for treat			aking required to meet individua	I patient needs.
Age 0-4 yr	step i	step 2	Step 3 and consider a short course of systemic CS	Step 3 and consider a short course of systemic CS
Age 5-11 yr			Step 3: medium-dose ICS option and consider a short course of systemic CS	Step 3: medium-dose ICS option or Step 4 and consider a short course of CS
	<ul> <li>Children 0-4 yr old: If adjusting therapy acc</li> </ul>	no clear benefit is observe	asthma control that is achieved. d in 4-6 wk, stop treatment and o	

#### AGES 0-4 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA



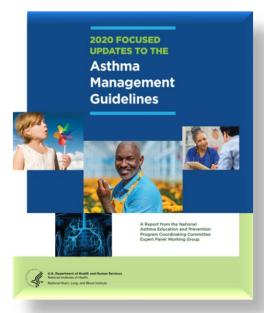




### AGES 5-11 YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA

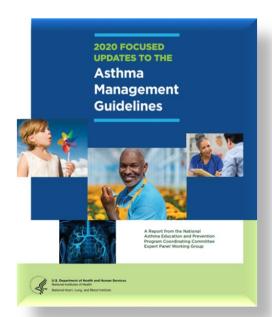
Intermittent

	Asthma	Manag	ement of Persiste	ent Asthma in Ind	lividuals Ages 5-	11 Years
Treatment	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
Preferred	PRN SABA	Daily low-dose ICS and PRN SABA	Daily and PRN combination low-dose ICS-formoterol	Daily and PRN combination medium-dose	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily LTRA,* or Cromolyn,* or Nedocromil,* or Theophylline,* and PRN SABA	Daily medium- dose ICS and PRN SABA or Daily low-dose ICS-LABA, or daily low-dose ICS + LTRA,* or daily low-dose ICS +Theophylline,* and PRN SABA	Daily medium- dose ICS-LABA and PRN SABA or Daily medium- dose ICS + LTRA* or daily medium- dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* or daily high-dose ICS + Theophylline,* and PRN SABA	Daily high-dose ICS + LTRA* + oral systemic corticosteroid or daily high-dose ICS + Theophylline* + oral systemic corticosteroid, and PRN SABA
		immunotherapy as an a in individuals ≥ 5 years	ly recommend the use o adjunct treatment to sta of age whose asthma is I maintenance phases of	ndard pharmacotherapy controlled at the	Consider On	nalizumab** ▲
			Assess	Control		





#### AGES 12+ YEARS: STEPWISE APPROACH FOR MANAGEMENT OF ASTHMA Intermittent Management of Persistent Asthma in Individuals Ages 12+ Years Asthma STEP 6 STEP 5 STEP 4 STEP 3 STEP 2 Treatment STEP 1 PRN SABA Daily low-dose ICS Daily and PRN Daily and PRN Daily high-dose Daily medium-high ICS-LABA + and PRN SABA combination combination dose ICS-LABA + low-dose ICSmedium-dose LAMA and oral systemic Preferred or ICS-formoterol▲ formoterol \* PRN SABA . corticosteroids + PRN SABA PRN concomitant ICS and SABA ▲ Daily LTRA\* and Daily medium-Daily medium-Daily medium-high PRN SABA dose ICS and PRN dose ICS-LABA or dose ICS-LABA SABA daily medium-dose or daily high-dose or ICS + LAMA, and ICS + LTRA.\* and Cromolyn,\* or PRN SABA A PRN SABA Nedocromil.\* or Daily low-dose or Zileuton.\* or ICS-LABA, or daily Theophylline,\* and low-dose ICS + Daily medium-LAMA, ▲ or daily PRN SABA dose ICS + LTRA,\* Alternative low-dose ICS + or daily medium-LTRA,\* and dose ICS + PRN SABA Theophylline,\* or daily medium-dose ICS + Zileuton.\* Daily low-dose ICS and PRN SABA + Theophylline\* or Zileuton,\* and PRN SABA Steps 2-4: Conditionally recommend the use of subcutaneous Consider adding Asthma Biologics immunotherapy as an adjunct treatment to standard pharmacotherapy (e.g., anti-IgE, anti-IL5, anti-IL5R, in individuals \$\geq 5\$ years of age whose asthma is controlled at the anti-IL4/IL13)\*\* initiation, build up, and maintenance phases of immunotherapy A Assess Control





### Children 6-11 years

Personalized asthma management:

Assess, Adjust, Review

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

STEP 1

Low dose ICS

SABA taken

taken whenever

Consider daily low dose ICS

P	R	E	F	E	R	R	Е	D	
С	O	N	1	ı	20	)L	Ĺ	Ε	R

to prevent exacerbations and control symptoms

Other controller options

RELIEVER

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)	OR low dose <sup>†</sup> ICS-formoterol maintenance and reliever therapy (MART). Refer for expert advice	add-on therapy, e.g. anti-IgE
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.

STEP 3

As-needed short-acting beta2-agonist (or ICS-formoterol reliever for MART as above)

\*Very low dose: BUD-FORM 100/6 mcg

STEP 4

Medium dose

ICC I ADA

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

STEP 5

Refer for

phenotypic

assessment

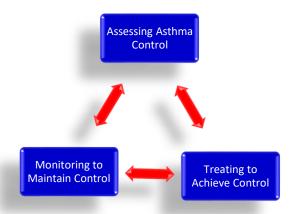
± higher dose

ICS-LABA or

but consider side-effects

# Monitoring is essential to:

- Maintain control
- Establish lowest step/dose treatment



2 to 6 weeks after initial visit

Every 3 months thereafter



### Stepping down treatment when asthma is controlled

- Full benefit: 3 month
- ICS+LABA: reduce ICS 50% while continuing LABA
- If controlled: stop LABA



# Approaches to Stepping Up Therapy

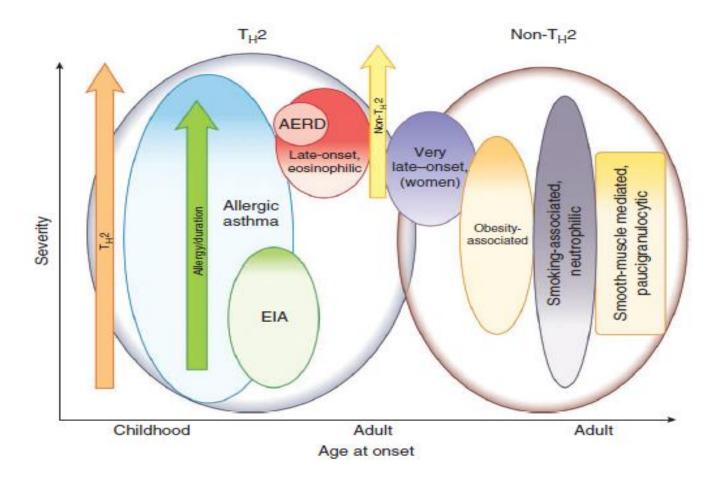
Step-Up Long-Term (SLT)	Step-Up Short-Term (SST)	Step-Up Intermittent (SUI)
Increase in therapy for uncontrolled asthma (weeks)	Increase in therapy for brief loss of control (days)	Increase in therapy for variable symptoms (day-to-day)
Persistent loss of control	Brief loss of control (upper respiratory tract infections, pet exposure)	Mild symptoms
Step-down therapy when control achieved after 3-6 months	Step-down therapy when control achieved after 3-10 days	Intermittent use

### Choosing between controller options

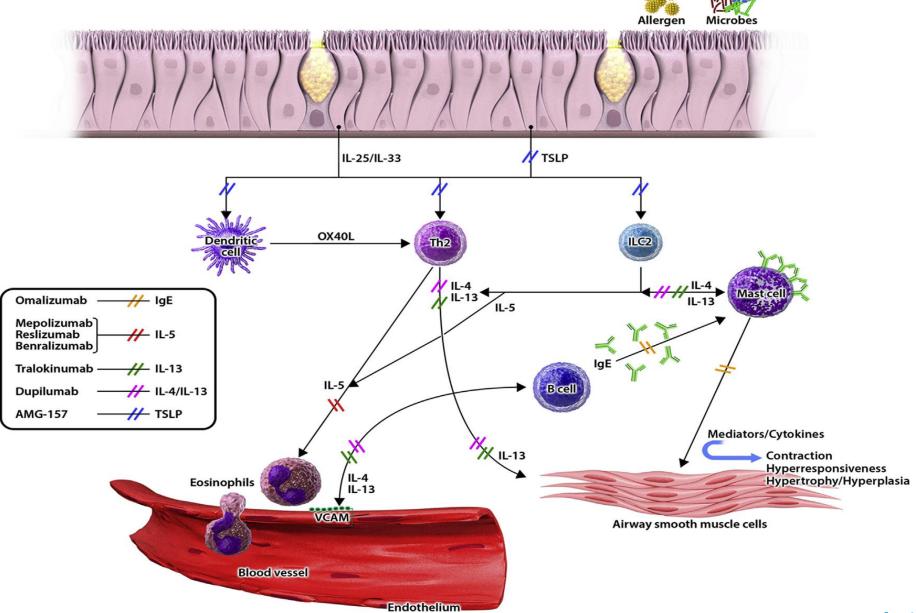


Population-level decisions

Individual patient decisions









# Asthma Management

- 1- Develop Patient/Doctor Partnership
- 2- Identify / Reduce Exposure to Risk Factors
- 3- Assess, Treat and Monitor Asthma
- 4- Manage Asthma Exacerbations
- 5- Special Considerations



### **Develop Patient/Doctor Partnership**

- Clear communication
- Educate continually
- Include the family
- Information about asthma
- Action plan



sthma Action Plan			
or: octor's Phone Number	Doctor:		Date:
ctor's Phone Number		Department Phone Number	
Doing Well	Take these long-term control r	nedicines each day (include an anti- How much to take	Inflammatory). When to take it
<ul> <li>No cough, wheeze, chest tightness, or shortness of breath during the day or night</li> <li>Can do usual activities</li> </ul>	The state of the s	How inuch to take	when to take it
And, if a peak flow meter is used,			
Peak flow: more than			
(80 percent or more of my best peak flow)			<u> </u>
My best peak flow is:		(C- <u>0</u>	<u> 2886</u>
Before exercise	0	2 or 4 puffs	5 minutes before exercise
Asthma Is Getting Worse  Cough, wheeze, chest tightness, or shortness of breath, or Waking at night due to asthma, or Can do some, but not all, usual activities  Or-	If your symptoms (and	ta_agorist) Di Nebultzer, on peak flow, if used) return to GREEN to be sure you stay in the green zone.	rfts, every 20 minutes for up to 1 hour ce ZONE after 1 hour of above treatment:
(50 to 79 percent of my best peak flow)	o Take:	(short-acting bota <sub>2</sub> -agonist)	a 2 or a 4 puffs or a Nebulizer
	ra Add:		mg per day For(3-10) days
	Call the doctor of before		ng the oral steroid.
Medical Alert!	Take this medicine:		
■ Very short of breath, or	0		o 6 putts or o Nebulzer
<ul> <li>Quick-relief medicines have not helped, or</li> <li>Cannot do usual activities, or</li> </ul>	(short-actin	g bota <sub>2</sub> agonist)	
Symptoms are same or get worse after	land.	storoid) mg	
24 hours in Yellow Zone	Then call your doctor NOW. G	o to the hospital or call an ambulance it:	
-Or-	You are still in the red zone after	ar 15 mini dog AND	
Dook flower loss than	<ul> <li>You have not reached your do</li> </ul>	ator.	
Peak flow: less than	■ You have not reached your do	ofor.	
(50 percent of my best peak flow)		otor.	
(SO percent of my best peak flow)		ator.	guick-relief medicine AND
(50 percent of my best pask flow)  NGER SIGNS Trouble walking and talk!	ng due to shortness of breath	■ Take □ 4 or □ 6 puffs of your o	quick-relief medicine AND
(50 percent of my best peak flow)	ng due to shortness of breath	■ Take □ 4 or □ 6 puffs of your o	quick-relief medicine AND
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(SO percent of my best peak flow)  NGER SIGNS Trouble walking and talk!  Lips or fingernalis are bit.	ng due to shortness of breath ue See the reverse side for things you our Asthma Worse	■ Take □ 4 or □ 6 puffs of your of on the hospital or call for all can do to avoid your asthma triggers.	ulck-rellef medicine AND n ambulance NOW!
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(SO percent of my best peak flow)  NGER SIGNS Trouble walking and talk!  Lips or fingernalis are blue.  To Control Things That Make You this guide suggests things you can do to avoid and ask your doctor to help you find out if you.  Alliergens  Animal Dander Some people are allergic to the flakes of skin of with hir or feathers.	ng due to shortness of breath ue See the reverse side for things you our Asthma Worse Tyour asthma triggers. Put a check next this we other triggers as well. Then decide to	■ Take □ 4 or □ 6 puffs of your o ■ Go to the hospital or call for all can do to avoid your asthma triggers.  to the triggers that you know make your as with your doctor what steps you will take. □ Indoor Mold ■ Rx leaky taucets, pipes, o around them.	n ambulanceNOW!
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Other Things That Can Make Asthma Worse
Suffles in foods and beverages: Do not drink beer or wife or eal dried truit, processed potatioes, or shrimp if they cause asthma symptoms.
Cold air: Cover your nose and mouth with a scart on cold or windy days.

Other medicines: Tell your doctor about all the medicines you take.
 Include cold medicines, aspirin, vitamins and other supplements, and nonselective beta-blockers (holuding those in eye drops).

Many people with asthma are allergic to the dried droppings and remains of cockroaches.

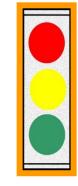
The best thing to do:

The best triing to do:

Keep food and garbage in closed containers. Never leave food out.

Use polson balts, powders, gels, or paste (for example, bortic acid).
You can also use traps.

If a spray is used to kill roaches, stay out of the room until the odor goes away.





### Factors Involved in Non-Adherence

### **Medication Usage**

- Difficulties with inhalers
- Complicated regimens
- side effects
- Cost

### **Non-Medication Factors**

- Misunderstanding/lack of information
- Fears about side-effects
- Inappropriate expectations
- Underestimation of severity
- Cultural factors
- Poor communication

## Conclusions

### well-planned treatment strategy

- 1. Partnerships between physician and patients
- 2. Education
- 3. Action plan
- 4. Drug therapy
- 5. Improving adherence



