Asthma Part II Classification Control and Treatments

Pharmacotherapy I

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Four Component Of Asthma Care

- Assessing and monitoring asthma severity and control
- Education for a partnership in care
- Control of environmental factors and co- morbid conditions that affect asthma
- Medications

Classification Of Severity and control

- National Asthma Education Prevention Program (NAEPP) recommendations categorized by age
- Stepwise approach
- Step 1: classify asthma severity
- Step 2: initiate treatment according to asthma severity
- Step 3: assess asthma control at follow up
- Step 4: step up or down treatment according to control

Adult Asthma

Goals of Therapy

Reduce Impairment

- The frequency and intensity of symptoms and functional limitations is experiencing or has recently experienced.

Reduce Risk

- The likelihood of asthma exacerbations and death, progressive decline in lung function (or for children, reduced lung growth), or risk of adverse effects from medications.

Goals of Therapy

1

#1 : Reduce impairment

- Prevent chronic, troublesome symptoms
- Require infrequent use (≤ 2 days a week) of inhaled SABA for quick relief of symptoms
- Maintain (near-) normal pulmonary function (PEF 80% of personal best)
- Maintain normal activity levels
- Meet patients' & families' expectations of and satisfaction with care

2

#2 : Reduce risk

- Prevent recurrent exacerbations
- Minimize need for visits/hospitalizations
- Prevent loss of lung function
- Prevent reduced lung growth in children
- Minimize adverse effects of therapy

Modifiable Risk Factors for Increase Exacerbation

Poor symptom control	High SABA use (mortality > 200 doses/mo)	Inadequate ICS
Low FEV1	Major Psych or socioeconomic problems	Exposures
Comorbidities	Eosinophilia (blood or sputum)	Pregnancy

Other Considerations

Vaccinations

- Influenza
- Pneumococcal

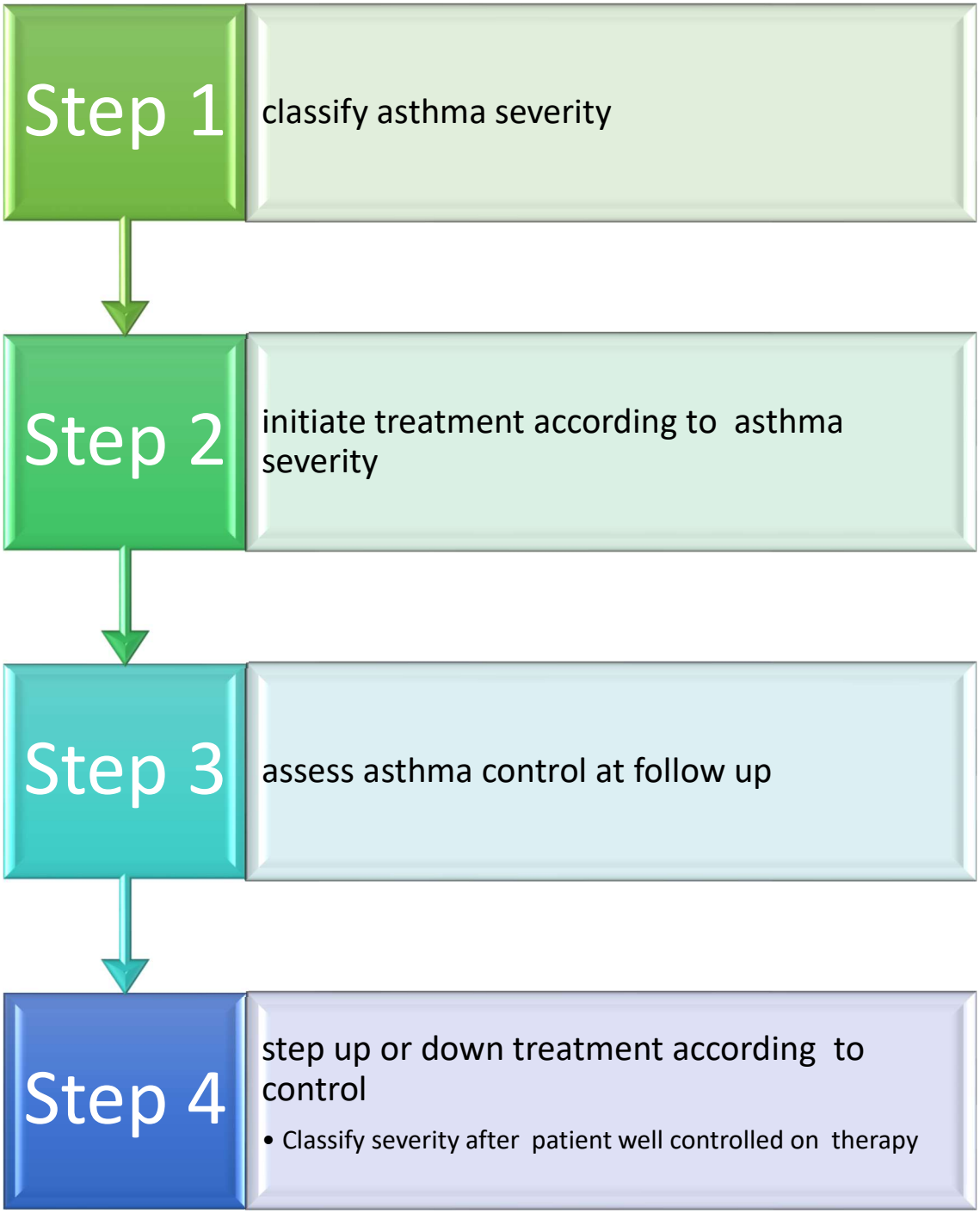
OTC treatment is inappropriate at any stage

- Indicated for mild infrequent symptoms
- If symptoms last >24 hours, exclusion for self treatment
- Racepinephrine (nebulizer solution/inhaler)
- Ephedrine/guaifenesin combo products

Use of Beta-adrenergic blockers

AMEBBA (also nebivolol (Bystolic)) = β1-selective

Stepwise Approach



Step 1 : assess asthma severity

Impairment

- Frequency of symptoms
- Nighttime awakenings
- Use of SABA for symptom control
- Interference with normal activity
- Missed work or school days
- Lung function (FEV1 and FEV1/FVC) (only for ≥ 5 yrs)

Risk

- Exacerbations requiring oral steroids
- Assigned according to the most severe category of impairment or risk

NOT Currently Taking Controllers

Components of Severity		Classification of Asthma Severity ≥12 years of age			
			Persistent		
		Intermittent	Mild	Moderate	Severe
Impairment **Normal FEV_1/FVC:** **8–19 yr 85%** **20 –39 yr 80%** **40 –59 yr 75%** **60 –80 yr 70%**	Symptoms	≤2 days/week	> 2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not more than 1x on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV_1 between exacerbations • FEV_1 >80% predicted • FEV_1/FVC normal	• FEV_1 >80% predicted • FEV_1/FVC normal	• FEV_1 > 60% but < 80% predicted • FEV_1/FVC reduced 5%	• FEV_1 <60% predicted • FEV_1/FVC reduced >5%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2/year (see note) →		
		← Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. →			
		Relative annual risk of exacerbations may be related to FEV_1.			
Recommended Step for Initiating Treatment **(See figure 4–5 for treatment steps.)**		**Step 1**	**Step 2**	**Step 3** and consider short course of oral systemic corticosteroids	**Step 4 or 5**
		In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

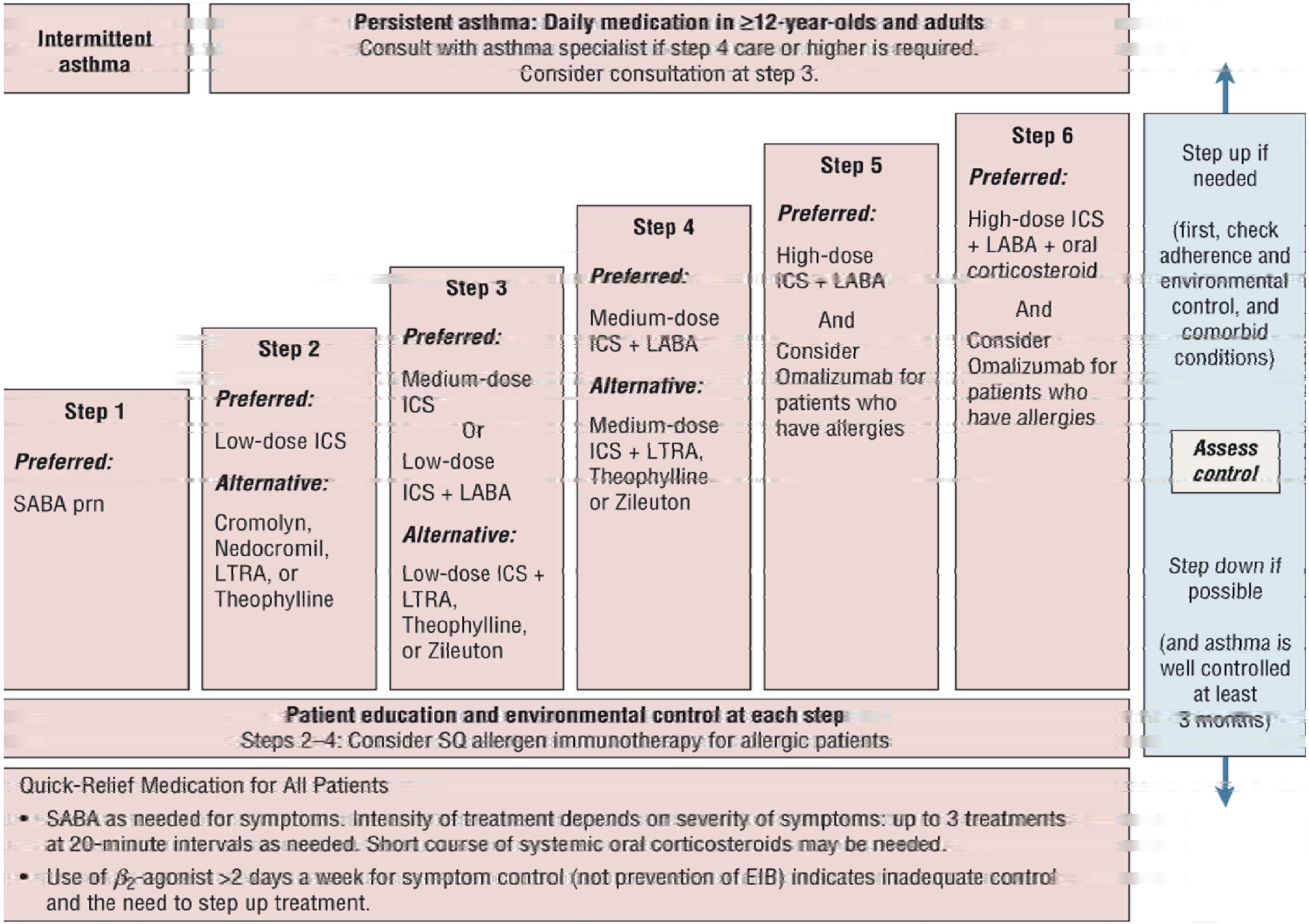
Step: 2 : Initiate treatment according to asthma severity

Severity is correlated to a classification of asthma

- Intermittent
- Mild Persistent
- Moderate Persistent
- Severe Persistent

Classification of asthma is correlated to a step

Step is correlated to the preferred treatment



Source: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM: *Pharmacotherapy: A Pathophysiologic Approach, Ninth Edition:* www.accesspharmacy.com

Inhaled Corticosteroid Doses for Asthma (Adapted from NAEPP EPR-3 2007)					
ICS generic/trade names	**Dosage forms**	**Age**	**Low Daily Dose**	**Medium Daily Dose**	**High Daily Dose**
Beclomethasone ▪ QVAR	HFA MDI: 40 or 80 µg/puff	5–11	80–160	>160–320	>320
		≥12	80–240	>240–480	>480
Budesonide ▪ Pulmicort ▪ Symbicort (with formoterol)	Respules for nebulization: 0.25, 0.5, 1.0 mg/neb	0–4	0.25–0.5	>0.5–1.0	>1.0
		5–11	0.5	1.0	2.0
	Flexhaler DPI: 90 or 180 µg/inh	5–11	180–400	>400–800	>800
		≥12	180–600	>600–1200	>1200
	Symbicort HFA MDI: 80/4.5 or 160/4.5 µg/puff	≥12	320 (80/4.5 2 puff BID)	640 (160/4.5 2 puff BID)	
Ciclesonide ▪ Alvesco	HFA MDI: 80 or 160 µg/puff	5-11*	80–160	>160–320	>320
		≥12	160–320	>320–640	>640 (Mfr highest recommended dose 640 µg/day)
Flunisolide ▪ Aerospan	HFA MDI: 80 µg/inh	6-11	160	320	≥640
		≥12	320	>320–640	>640
Fluticasone ▪ Flovent ▪ Advair (with salmeterol)	HFA MDI: 44, 110, or 220 µg/puff	0–11	88–176	>176–352	>352
		≥12	88–264	>264–440	>440
	Flovent Diskus DPI: 50, 100, or 250 µg/inh	5–11	100–200	>200–400	>400
		≥12	100–300	>300–500	>500
	Advair HFA MDI: 45/21, 115/21, or 230/21 µg/puff	4–11	180 (45/21 2 puff BID)		460–920 (115–230/21 2 puff BID)
		≥12	180 (45/21 2 puff BID)	460 (115/21 2 puff BID)	920 (230/21 2 puff BID)
	Advair Diskus DPI: 100/50, 250/50, or 500/50 µg/inh	4–11	200 (100/50 1 inh BID)		500–1000 (250–500/50 1 inh BID)
		≥12	200 (100/50 1 inh BID)	500 (250/50 1 inh BID)	1000 (500/50 1 inh BID)
Mometasone ▪ Asmanex ▪ Dulera (with formoterol)	Asmanex Twisthaler DPI: 110 or 220 µg/inh	4–11	110 (Mfr highest recommended dose 110 µg/day)	220–440	>440
		≥12	220	440	>440 (Mfr highest recommended dose 800 µg/day)
	Dulera HFA MDI: 100/5 or 200/5 µg/puff	≥12		400 (100/5 2 puff BID)	800 (200/5 2 puff BID)

*Not FDA approved for children <12 years

Step 3 :Assess asthma control at follow up

Impairment

- frequency of symptoms
- nighttime awakenings
- use of SABA for symptom control
- interference with normal activity
- lung function (FEV1 and FEV1/FVC) (only for ≥ 5 yrs)
- validated questionnaires (ATAQ, ACQ, ACT) (only for ≥12 yrs)

Risk

- exacerbations requiring oral steroids
- progressive loss of lung function
- treatment related adverse effects

Level of control is based on the most severe impairment or risk category

1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work or at home?

None of the time	A little of the time	Some of the time	Most of the time	All of the time
☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

2. During the past 4 weeks, how often have you had shortness of breath?

Not at all	Once or twice a week	3 to 6 times a week	Once a day	More than once a day
☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

3. During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?

Not at all	Once or Twice	Once a week	2 to 3 nights a week	4 or more nights a week
☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as Albuterol, Ventolin®, Proventil®, Maxair® or Primatene Mist®)?

Not at all	Once a week or less	2 or 3 times per week	1 or 2 times per day	3 or more times per day
☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

5. How would you rate your asthma control during the past 4 weeks?

Completely Controlled	Well Controlled	Somewhat Controlled	Poorly Controlled	Not Controlled at all
☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

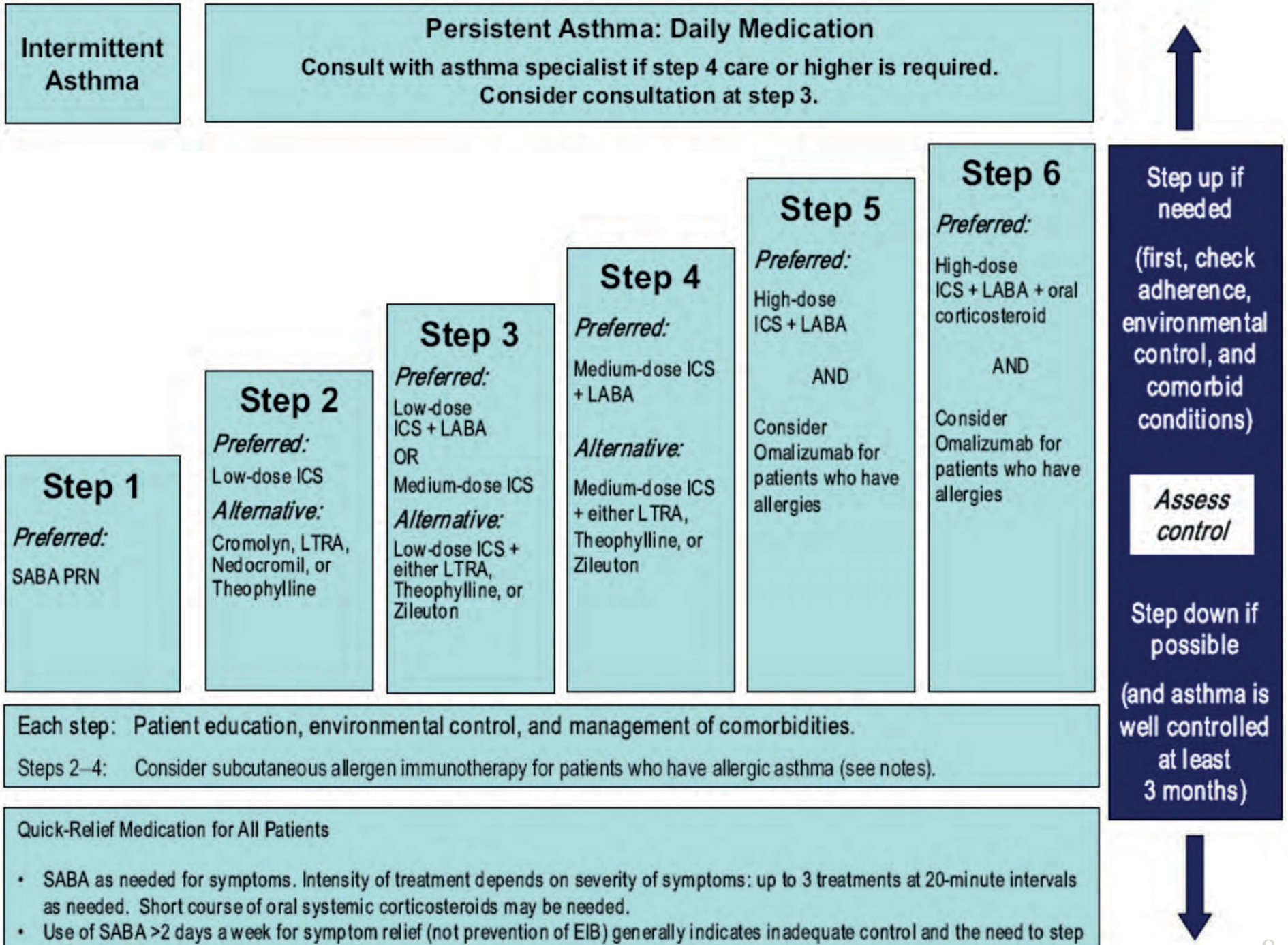
To score the ACT: Each response to the 5 ACT questions has a point value from a 1 to 5 as shown on the form. To score the ACT, add up the point values for each response to all five questions.

Components of Control		Classification of Asthma Control (≥12 years of age)		
		Well Controlled	**Not Well Controlled**	**Very Poorly Controlled**
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2x/month	1–3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV_1 or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	Validated questionnaires ATAQ ACQ ACT	 0 ≤0.75* ≥20	 1–2 ≥1.5 16–19	 3–4 N/A ≤15
Risk	**Exacerbations requiring oral systemic corticosteroids**	**0–1/year**	**≥2/year (see note)**	
		Consider severity and interval since last exacerbation		
	Progressive loss of lung function	Evaluation requires long-term followup care		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment **(see figure 4–5 for treatment steps)**		• Maintain current step. • Regular followups every 1–6 months to maintain control. • Consider step down if well controlled for at least 3 months.	• Step up 1 step and • Reevaluate in 2–6 weeks. • For side effects, consider alternative treatment options.	• Consider short course of oral systemic corticosteroids, • Step up 1–2 steps, and • Reevaluate in 2 weeks. • For side effects, consider alternative treatment options.

Step 4 : Step up or down treatment according to control

How well patient is controlled is correlated to a recommended action for treatment

Just as important to step down medication for patients with well controlled asthma as it is to step up medication for those with uncontrolled asthma


Intermittent Asthma
Persistent Asthma: Daily Medication
Consult with asthma specialist if step 4 care or higher is required.
Consider consultation at step 3.
Step 1
Preferred:
SABA PRN
Step 2
Preferred:
Low-dose ICS
Alternative:
Cromolyn, LTRA, Nedocromil, or Theophylline
Step 3
Preferred:
Low-dose ICS + LABA
OR
Medium-dose ICS
Alternative:
Low-dose ICS + either LTRA, Theophylline, or Zileuton
Step 4
Preferred:
Medium-dose ICS + LABA
Alternative:
Medium-dose ICS + either LTRA, Theophylline, or Zileuton
Step 5
Preferred:
High-dose ICS + LABA
AND
Consider Omalizumab for patients who have allergies
Step 6
Preferred:
High-dose ICS + LABA + oral corticosteroid
AND
Consider Omalizumab for patients who have allergies
Step up if needed
(first, check adherence, environmental control, and comorbid conditions)
Assess 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
• 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.
• Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

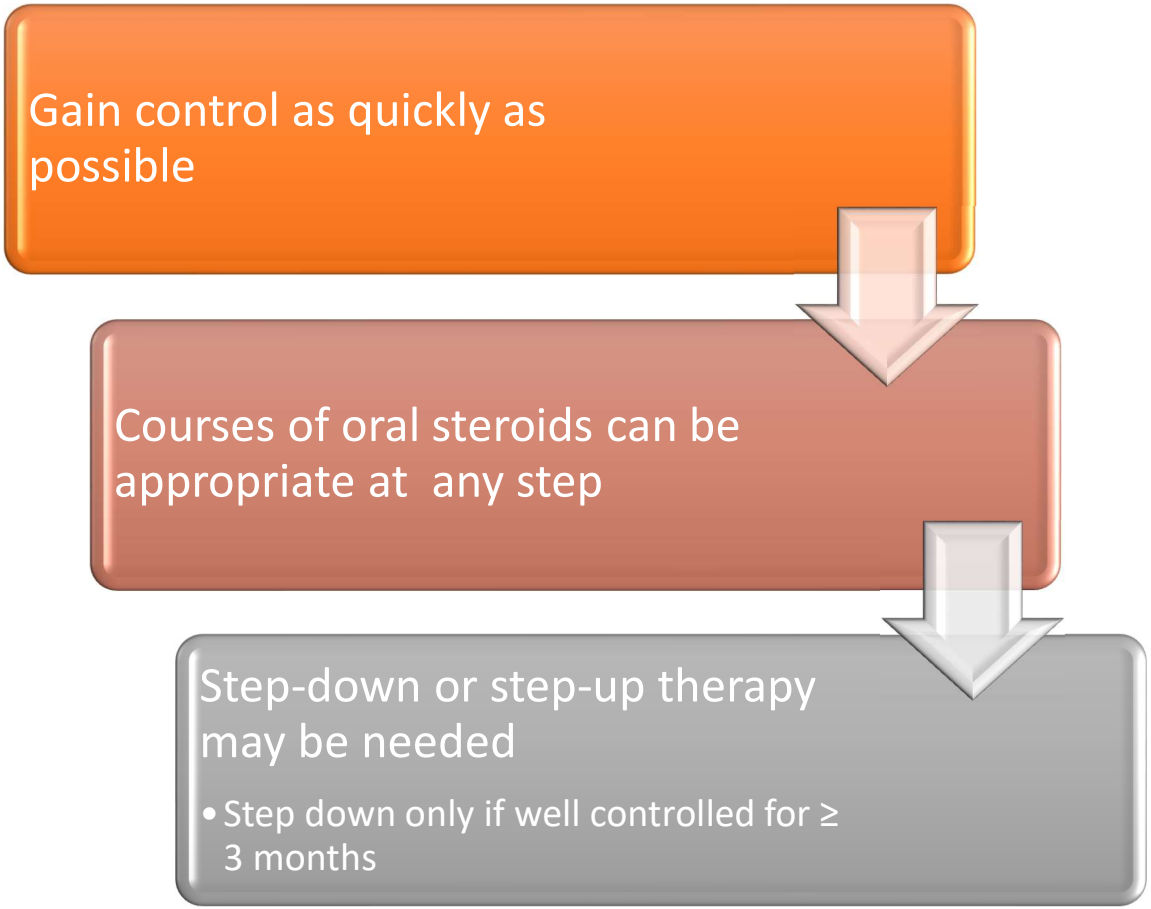
Classifying Asthma severity after the patient becomes well controlled on treatment

Classifying Asthma severity after the patient becomes well controlled on treatment				
Classification of asthma severity				
	Intermittent	Persistent		
		Mild	Moderate	Severe
Lowest level of treatment required for control	Step 1	Step 2	Step 3 or 4	Step 5 or 6

Treatment Overview for Adults

- Quick relief: SABA for all patients
- Long-term control
- Preferred
    - ICS for persistent asthma
    - increased ICS dose or addition of long-acting β2-agonist (LABA) for further controlAlternatives
    - cromolyn, leukotriene modifiers, theophylline, tiotropium
- Omalizumab: severe uncontrolled asthma & atopy
- Mepolizumab/Reslizumab: eosinophilic severe uncontrolled asthma

Treatment Pearls



Follow up

Regular follow up

1 to 6-month intervals depending on control

- 2-6 weeks not well controlled
- 2 weeks very poorly controlled

3-month interval if step down anticipated

Always review education at each visit

Assess medication adherence and technique

Assess treatment related adverse effects

Patient satisfaction with care

Self managed care (asthma action) plans

Self Managed Care

Comprehensive asthma self care plan

- Includes when to utilize long term control meds and quick relief meds, how to use asthma devices, how to avoid and minimize effects of asthma triggers, how to prevent escalation of asthma symptoms into exacerbations, how to recognize warning signs that require emergent medical treatment

Asthma Action Plan

- Assist patients to monitor and recognize worsening asthma, and to respond appropriately to those symptoms or changes in lung function.

- **Green zone**
- **Yellow zone**
- **Red zone**

Peak Flow Monitoring

Establishment of “personal best”

- Highest value achieved over 2 week period when patient is well controlled

Zone system

- GREEN: >80% of personal best
- YELLOW: 50-79% of personal best
- RED: <50% of personal best

Increases of ≥20% post-B2-agonist may mean additional medication is needed

Asthma Action Plan

[To be completed by Health Care Provider]

Updated On: _____

Name _____ Date of Birth _____

Address _____ Emergency Contact/Phone _____

Health Care Provider Name _____ Phone _____ Fax _____

Asthma Severity: ❑Mild Intermittent ❑Mild Persistent ❑Moderate Persistent ❑Severe Persistent

Asthma Triggers: ❑Colds ❑Exercise ❑Animals ❑Dust ❑Smoke ❑Food ❑Weather ❑Other

If Feeling Well — Every Day Medicines

Child feels good:
- Breathing is good
- No cough or wheeze
- Can work / play
- Sleeps all night

Peak flow in this area:
_____ to _____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

20 minutes before exercise use this medicine:

If Not Feeling Well — Take Every Day Medicines and Add these Rescue Medicines

Child has *any* of these:
- Cough
- Wheeze
- Tight chest

Peak flow in this area:
_____ to _____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

Call doctor if these medicines are used more than two days a week.

If Feeling Very Sick Get help from Doctor NOW! — Take These Medicines

Child has *any* of these:
- Medicine is not helping
- Breathing is hard and fast
- Nose opens wide
- Can't walk of talk well
- Ribs show

Peak flow below:
_____

MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:

***SEEK EMERGENCY CARE or CALL 911 NOW if:** Lips are bluish, Getting worse fast, Hard to breathe, Can't talk or cry because of hard breathing or has passed out*

Health Care Provider Signature _____ Date _____

Patient Signature _____ Date _____

Sample Action Plan

Green Zone

- Doing well, no symptoms
- 80% of their personal best
- Take controller drug only
- Use 2 puffs of SABA 5-15 min before exercise
- If exercise-induced asthma or as needed for periodic mild symptoms

Yellow Zone

- Getting worse; some symptoms of wheezing and dyspnea
- 50-79% of personal best
- Use SABA 2-6 puffs by MDI or 1 neb treatment; may repeat in 20 minutes if needed
- Lower dose of 2-4 puffs SABA MDI usually recommended
- Reassess 1 hour after initial treatment

Yellow Zone 1 hour after initial treatment

Complete Response

- Consider OCS burst
- Contact clinician for f/u

Complete Response

- Repeat SABA; add OCS burst
- Contact clinician that day

Poor Response

- Repeat SABA; add OCS burst
- Contact clinician immediately; go to ER/call 911 if severe distress

May continue SABA every 3-4 hours regularly for 1-2 days OCS burst: prednisone 40-60mg/day x 5-10 days

Sample Action Plan: Red Zone

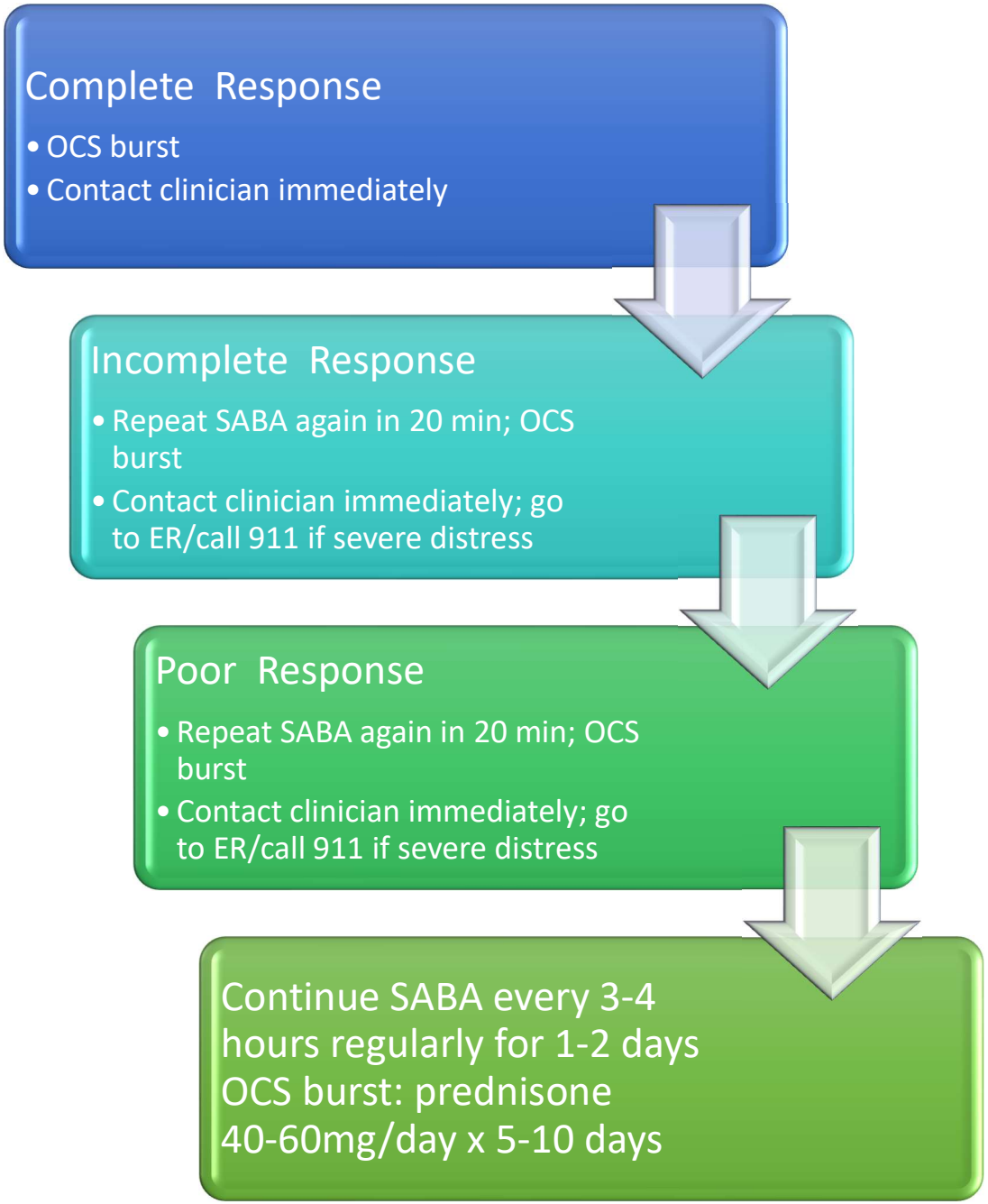
Medical alert; marked wheezing and dyspnea, inability to speak more than short phrases, use of accessory muscles, drowsiness or <50% personal best

Use SABA: 2-6 puffs by MDI or 1 neb tx; repeat in 20 minutes; if incomplete or poor response, repeat SABA again in 20 minutes

Higher dose of 4-6 puffs SABA MDI usually recommended

OCS burst (prednisone 40-60mg/d x 5-10 d)

Red Zone After repeating SABA in 20 MIN



Sample Action Plan: Red Zone

Proceed to ED or call 911 if distress is severe and unresponsive to treatment

Go to ED or call 911 immediately if lips or fingernails are blue or gray, or if trouble walking or talking due to SOB

Contact clinician immediately

Continue SABA every 3-4 hrs regularly for 1-2 days

Summary

Asthma control - two domains

- Assess symptom control over the last 4 weeks
- Assess risk factors for poor outcomes, including low lung function

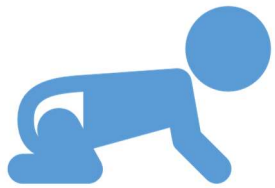
Treatment issues

- 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?

Comorbidities

- Think of rhinosinusitis, GERD, obesity, obstructive sleep apnea, depression, anxiety
- These may contribute to symptoms and poor quality of life

Childhood Asthma



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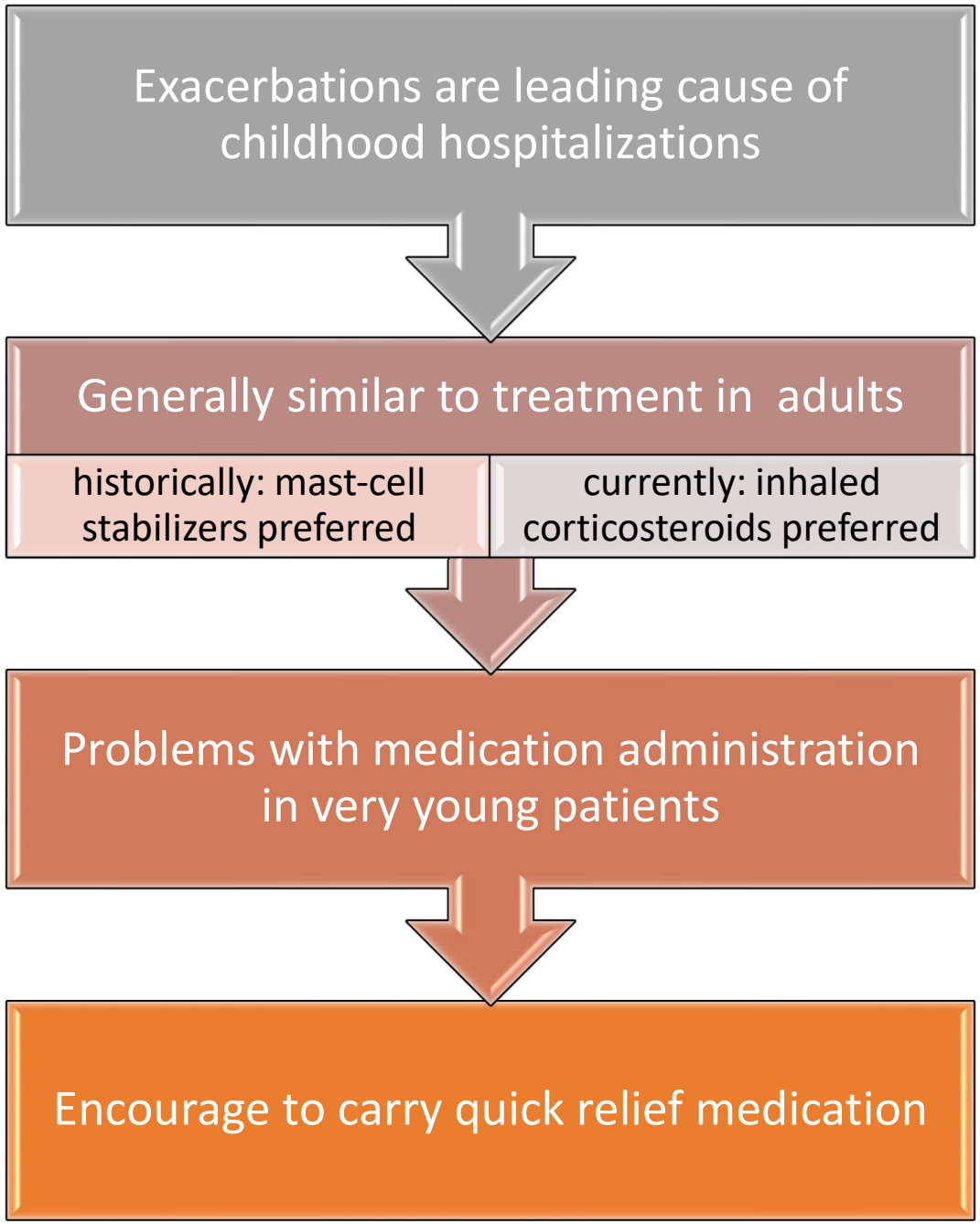
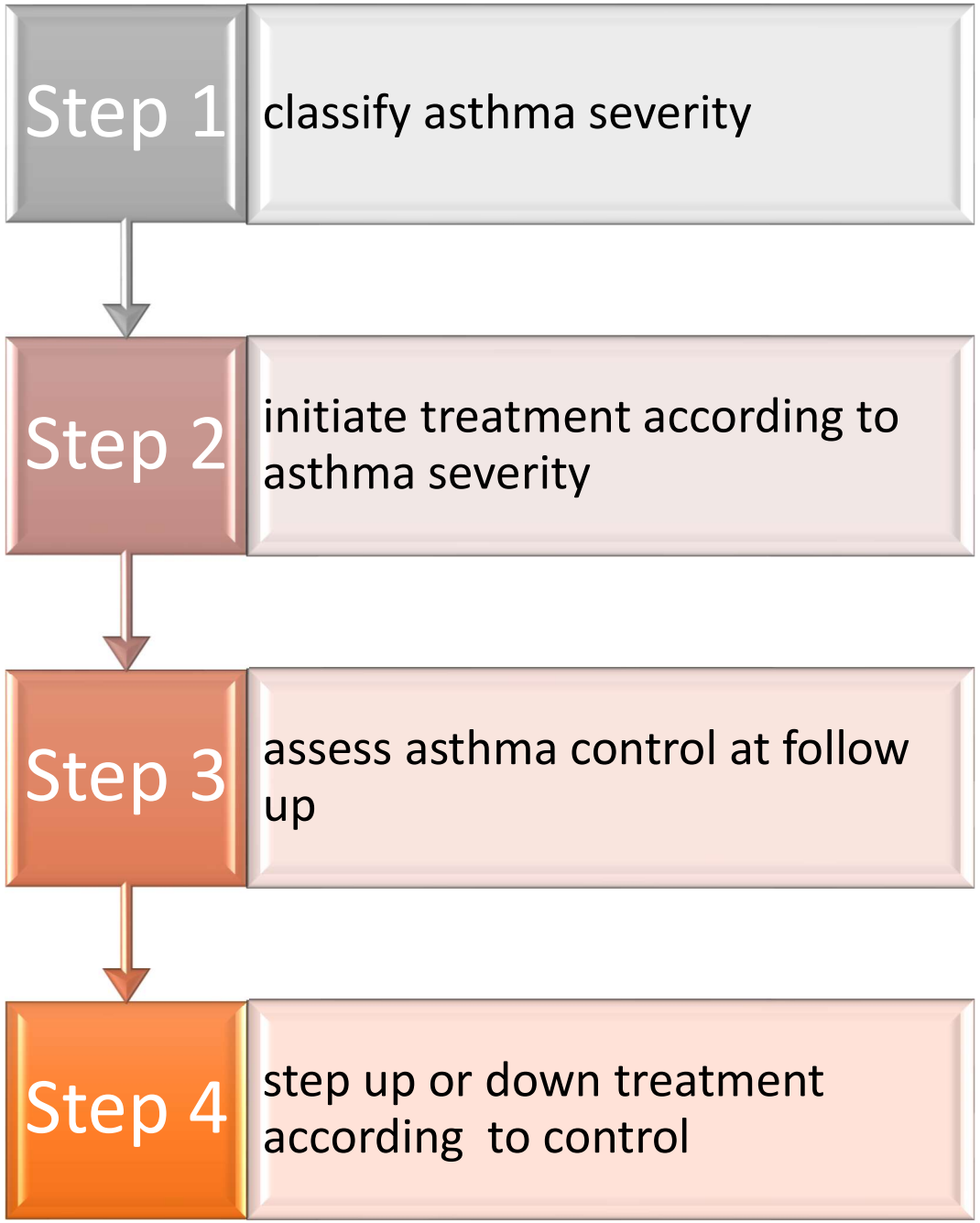


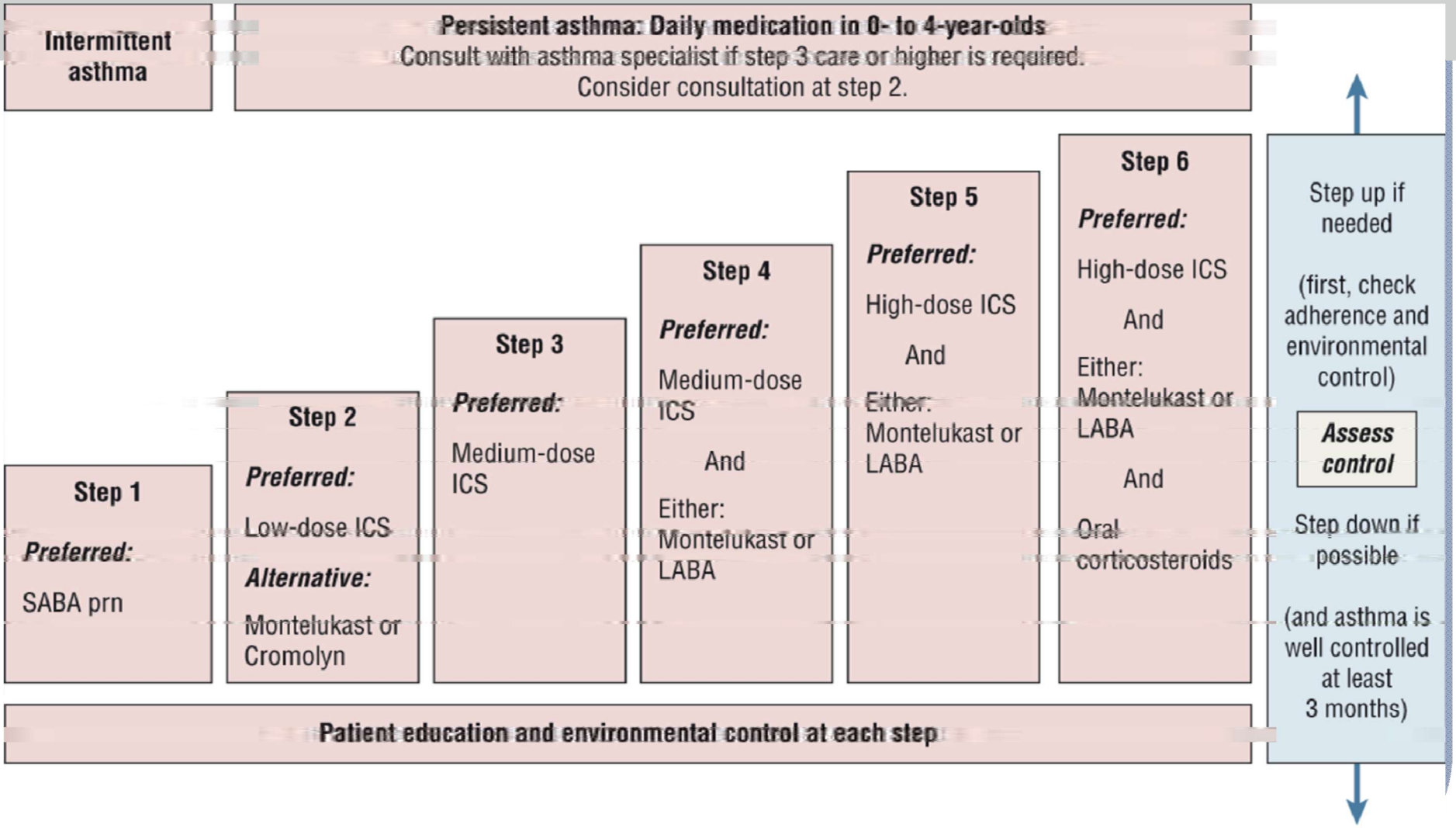
Use Same Stepwise Approach



Classifying Asthma Severity for Patients Not Currently Taking Long-term Control Medications (Children 0-4 and 5-11 years)

Components		Intermittent	Persistent		
			Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings (0-4 yr)	None	1-2 times/month	2-3 times/month	> Once a week
	Nighttime awakenings (5-11 yr)	≤twice/month	3-4 times/month	> Once per week but not nightly	Often 7 times/week
	SABA use for symptom control	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function (5-11 yr)	FEV_1 >80% FEV_1/FVC >85%	FEV_1 >80% FEV_1/FVC >80%	FEV_1 60-80% FEV_1/FVC 75-80%	FEV_1 <60% FEV_1/FVC <75%
Risk	Exacerbations	**Intermittent**	**Persistent**		
	(0-4 yr)	0-1/year	≥2 in 6 months or ≥4 wheezing episodes/1 yr lasting >1 day		
	(5-11 yr)	0-2/year	>2 in 1 year →		
Recommended step for initiating treatment		Step 1	Step 2	Step 3 and consider short course of systemic oral corticosteroids	

http://www.accesspharmacy.com/



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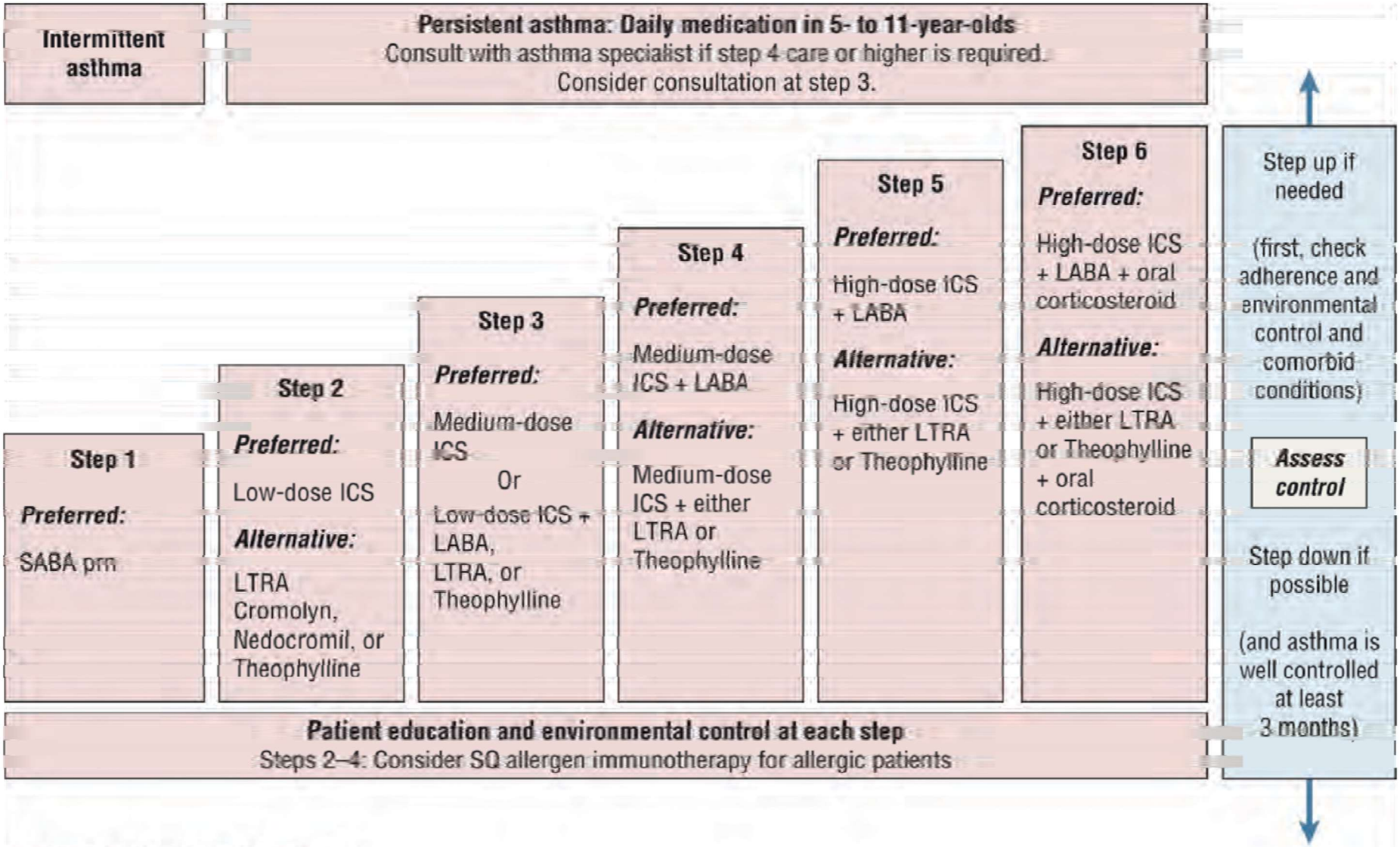

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		5–11	0.5	1.0	2.0
	Flexhaler DPI: 90 or 180 µg/inh	5–11	180–400	>400–800	>800
		≥12	180–600	>600–1200	>1200
	Symbicort HFA MDI: 80/4.5 or 160/4.5 µg/puff	≥12	320 (80/4.5 2 puff BID)	640 (160/4.5 2 puff BID)	
Ciclesonide ▪ Alvesco	HFA MDI: 80 or 160 µg/puff	5-11*	80–160	>160–320	>320
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	Advair Diskus DPI: 100/50, 250/50, or 500/50 µg/inh	4–11	200 (100/50 1 inh BID)		500–1000 (250–500/50 1 inh BID)
		≥12	200 (100/50 1 inh BID)	500 (250/50 1 inh BID)	1000 (500/50 1 inh BID)
Mometasone ▪ Asmanex ▪ Dulera (with formoterol)	Asmanex Twisthaler DPI: 110 or 220 µg/inh	4–11	110 (Mfr highest recommended dose 110 µg/day)	220–440	>440
		≥12	220	440	>440 (Mfr highest recommended dose 800 µg/day)
	Dulera HFA MDI: 100/5 or 200/5 µg/puff	≥12		400 (100/5 2 puff BID)	800 (200/5 2 puff BID)

*Not FDA approved for children <12 years

Treatment Overview for Children

0-4 years

- Preferred ICS
- many recommendations based on extrapolated data
- combination therapy inadequately studied
- no immunotherapy, no theophylline

5-11 years

- preferred ICS
- more treatment options
- treated similarly to older children and adults with one exception
  - the addition of LABA to inhaled corticosteroids has not been demonstrated to reduce the risk of exacerbations as it has in adults
- SQ Immunotherapy in steps 2-4

No omalizumab for children < 6 years

Assessing Asthma Control and Adjusting Therapy in Children

Components of Control		Well Controlled		Not Well Controlled		Very Poorly Controlled	
		Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11
Impairment	Symptoms	≤2 days/week but not more than once on each day		>2 days/week or multiple times on ≤2 days/week		Throughout the day	
	Nighttime awakenings	≤1x/month		>1x/month	≥2x/month	>1x/week	≥2x/week
	Interference with normal activity	None		Some limitation		Extremely limited	
	Short-acting β_2-agonist use for symptom control (not prevention of EIB)	≤2 days/week		>2 days/week		Several times per day	
	Lung function • FEV_1 (predicted) or peak flow personal best • FEV_1/FVC	N/A	>80% >80%	N/A	60–80% 75–80%	N/A	<60% <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1x/year		2–3x/year	≥2x/year	>3x/year	≥2x/year
	Reduction in lung growth	N/A	Requires long-term follow-up	N/A		N/A	
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.					

Recommended Action for Treatment

(See "Stepwise Approach for Managing Asthma" for treatment steps.)

The stepwise approach is meant to assist, not replace, clinical decisionmaking required to meet individual patient needs.

- Maintain current step.
- Regular followup every 1–6 months.
- Consider step down if well controlled for at least 3 months.

Step up 1 step

Step up at least 1 step

- Consider short course of oral systemic corticosteroids.
- Step up 1–2 steps

- **Before step up:**
  Review adherence to medication, inhaler technique, and environmental control.
  If alternative treatment was used, discontinue it and use preferred treatment for that step.
- **Reevaluate the level of asthma control in 2–6 weeks to achieve control; every 1–6 months to maintain control.**
  Children 0–4 years old: If no clear benefit is observed in 4–6 weeks, consider alternative diagnoses or adjusting therapy.
  Children 5–11 years old: Adjust therapy accordingly.
- **For side effects,** consider alternative treatment options.

Chronic Asthma Treatment Preferred - GINA

	0-4 year old	5-11 year old	≥ 12 years old
Step 1	No controller SABA PRN	No controller SABA PRN	No controller SABA PRN
Step 2	Low-dose ICS	Low-dose ICS	Low-dose ICS
Step 3	Medium does ICS	Medium does ICS	Medium does ICS or Low dose ICS Plus LABA
Step 4	Medium dose ICS And either Montelukast or LABA	Medium dose ICS + LABA	Medium dose ICS + LABA
Step 5	High dose ICS And either Montelukast or LABA	High dose ICS + LABA	High dose ICS + LABA
Step 6	High dose ICS and either Montelukast or LABA PLUS OC	High dose ICS + LABA + OC	High dose ICS + LABA + OC

Preferred Devices (0-5 years)

0-3 years

MDI + spacer with face mask

Nebulizer with face mask – alternative

4-5 years

MDI + spacer with mouthpiece

MDI + spacer with face mask – alternative

Nebulizer with face mask or mouth piece - alternative

Asthma Exacerbations (flare-ups)

Asthma Exacerbations

Risk factors for exacerbations

- Allergens, hospitalizations (poor control), drugs

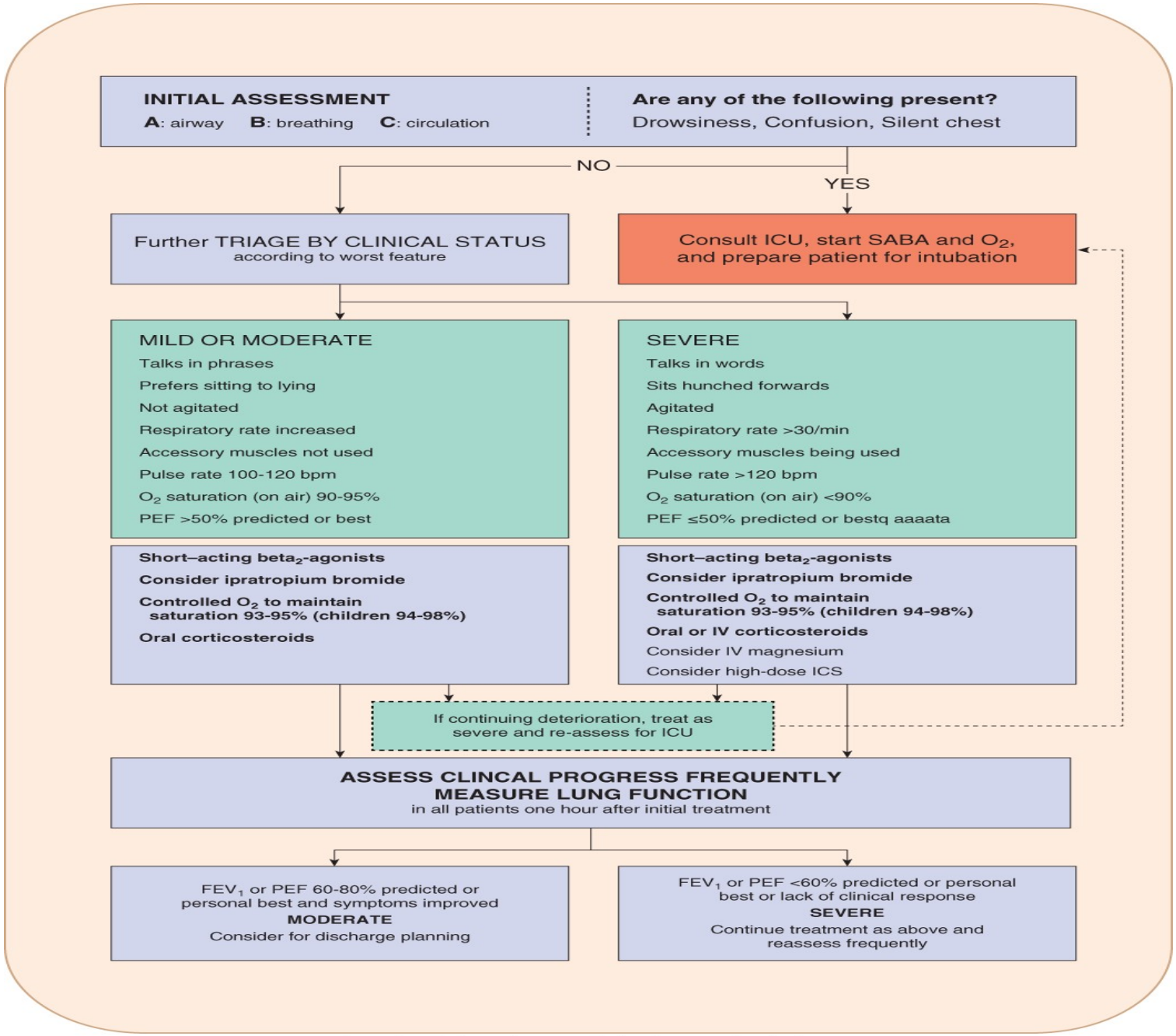
Uncontrolled CO-morbidities

Drug induced exacerbation

- NSAIDs
- Beta blockers
  - Antagonism of beta receptor even with β1 selective meds, should be avoided

Aspirin sensitive asthma

Management of asthma exacerbations in acute care facility, for example, emergency department.



Initial assessment of acute asthma exacerbations in children ≤5 years

Symptoms	Mild	Severe*
Altered consciousness	No	Agitated, confused or drowsy
Oximetry on presentation (SaO_2)**	>95%	<92%
Speech†	Sentences	Words
Pulse rate	<100 beats/min	>200 beats/min (0–3 years) >180 beats/min (4–5 years)
Central cyanosis	Absent	Likely to be present
Wheeze intensity	Variable	Chest may be quiet

*Any of these features indicates a severe exacerbation
**Oximetry before treatment with oxygen or bronchodilator
† Take into account the child's normal developmental capability

Initial management of asthma exacerbations in children ≤5 years

Therapy	Dose and administration
Supplemental oxygen	24% delivered by face mask (usually 1L/min) to maintain oxygen saturation 94-98%
Inhaled SABA	2–6 puffs of salbutamol by spacer, or 2.5mg by nebulizer, every 20 min for first hour, then reassess severity. If symptoms persist or recur, give an additional 2-3 puffs per hour. Admit to hospital if >10 puffs required in 3-4 hours.
Systemic corticosteroids	Give initial dose of oral prednisolone (1-2mg/kg up to maximum of 20mg for children <2 years; 30 mg for 2-5 years)
Additional options in the first hour of treatment	
Ipratropium bromide	For moderate/severe exacerbations, give 2 puffs of ipratropium bromide 80mcg (or 250mcg by nebulizer) every 20 minutes for one hour only
Magnesium sulfate	Consider nebulized isotonic $MgSO_4$ (150mg) 3 doses in first hour for children ≥2 years with severe exacerbation

Follow-up after an exacerbation

- Follow up all patients regularly after an exacerbation, until symptoms and lung function return tonormal
  - Patients are at increased risk during recovery from an exacerbation
- The opportunity
  - Exacerbations often represent failures in chronic asthma care, and they provide opportunities to review the patient's asthma managemen
- At follow-up visit(s), check:
  - The patient's understanding of the cause of the flare-up
  - Modifiable risk factors, e.g. smoking
  - Adherence with medications, and understanding of their purpose
  - Inhaler technique skills
  - Written asthma action plan

GINA 2016, Box 4-5

Asthma Special Population

Exercise Induced Asthma

Exercise induced Bronchospasm

Most people who have chronic asthma will experience symptoms when they exercise

- People without chronic asthma can develop symptoms only during exertion
- Coughing, tightness in chest, wheezing, SOB/fatigue while exercising

Symptoms of exercise-induced asthma

- Begin within five to 20 minutes after the start of physical activity, or 5-10 minutes after brief exercise has stopped

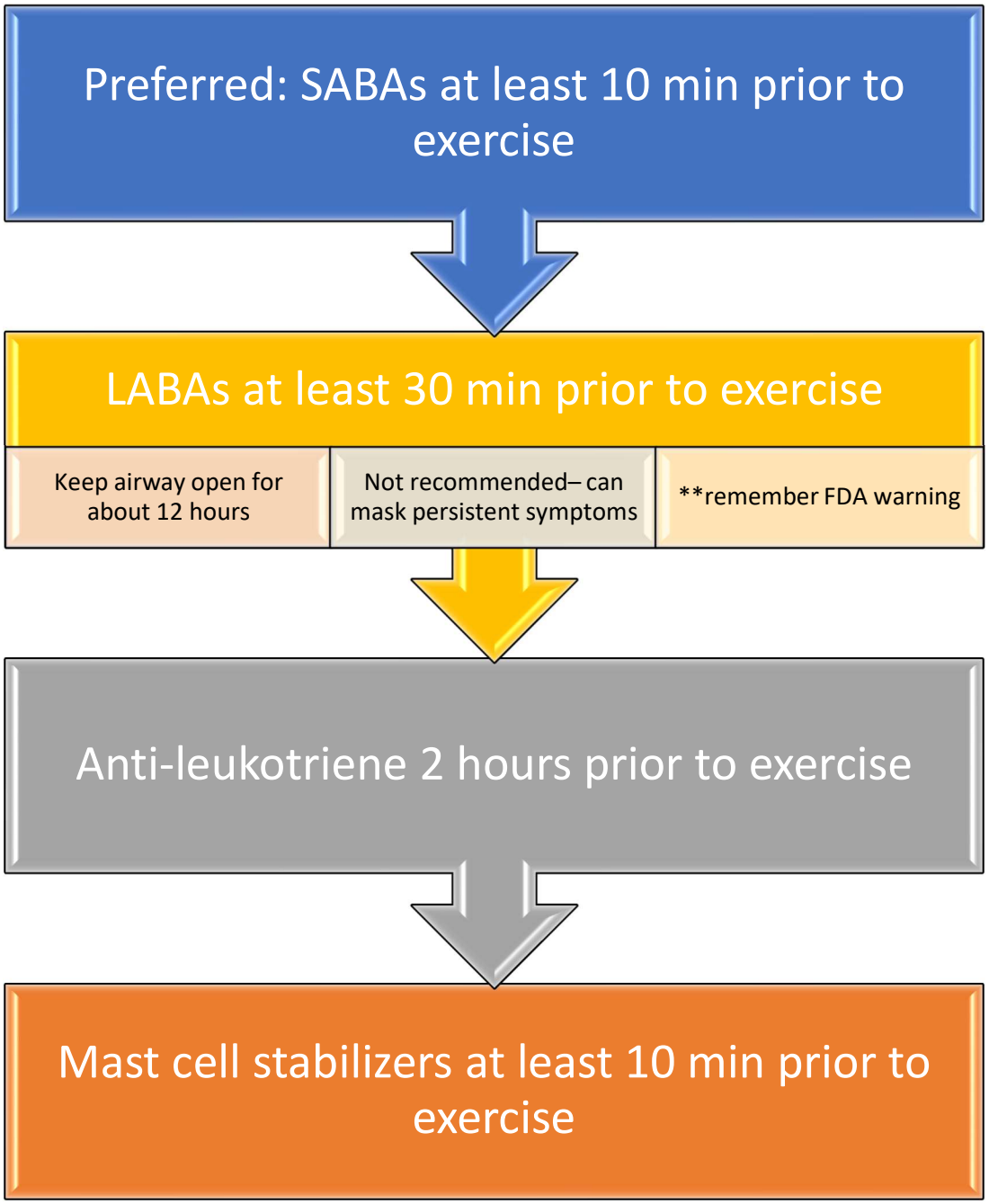
Risk factors

- Provoked more easily in cold, dry air
- Presence of pollens and pollutants in the air
- Upper respiratory infections

Exercise-Induced Asthma

- Defined as a drop in FEV1 of 15% or greater from baseline (pre-exercise value)
- Should still follow step-wise approach with these patients to assess for chronic asthma
- If chronic asthma, follow steps plus add SABA before exercise
- Pre-exercise SABA use should not be “counted” when assessing control

Exercised Induced Asthma Treatment



Pregnancy

Asthma in Pregnancy

Asthma may worsen, stay the same, or improve during pregnancy

Poorly treated asthma is a greater risk than drug exposure

Most clinical experience with budesonide and albuterol

Inhaled agents preferred

Treatment During Pregnancy

Preferred controller: Budesonide ICS

Preferred rescue: albuterol

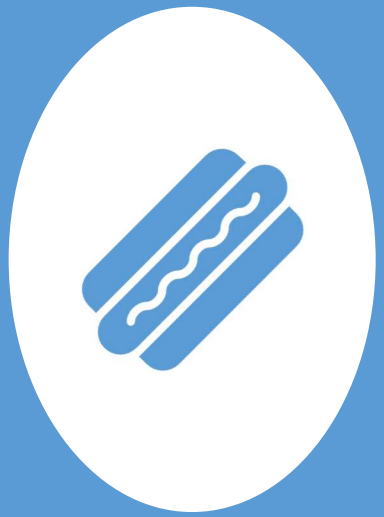
LABAs are category C; less clinical experience

- Use only if necessary, for control; salmeterol preferred

LTM modifiers have limited data

- Montelukast is category B
- Consider alternative therapy

Oral steroids appropriate when benefit outweighs risk



Obesity

Asthma and Obesity

More common than in non-obese patients

May be harder to control

Different airway inflammation

- OSA
- GERD
- Lack of fitness
- Reduction in lung volume due to abdominal fat

Treatment is the same

- May see ↓ response to ICS
- Include weight reduction in plan
- Exercise alone not sufficient
- 5-10% weight loss can increase control and improve QOL
- Most drastic results seen with bariatric surgery
- Weight loss improves control, lung fx, health status and decreases medication requirements

Other Comorbid Conditions

Conditions Affecting Asthma Severity

Viral respiratory infections

Environmental/occupational triggers

Psychosocial stressors

- Chronic stress/depression

Co-morbid conditions

- Allergic rhinitis (rhinitis/sinusitis)
- Gastroesophageal Reflux Disease (GERD)
- Obesity
- Obstructive sleep apnea

Hormonal changes

GERD

Patients with severe asthma more likely to have GERD than pts with mild asthma 41% vs 16%

Treatment with PPI

- **Treatment with lansoprazole for 24 weeks improved asthma-related quality of life and reduced exacerbations**
- May or may not improve symptoms
- Trial with PPI warranted with GERD and severe asthma
- H2 not expected to benefit

Obstructive Sleep Apnea (OSA)

Associated with both upper and systemic airway inflammation

Pharyngeal inflammation in OSA may promote upper airway collapse

Mechanical changes from treatment with CPAP for OSA could influence airway responsiveness

- Still controversial

Upper Airway Disease

Allergic or non-allergic rhinitis and sinusitis can contribute asthma:

- the release of mediators into the airways or peripheral circulation
- neural reflexes
- increased production of bone marrow progenitors of inflammatory cells
- increased lower airway exposure to airborne contaminants from mouth breathing
- increased need for conditioning the inspired air.

Both children and adults with comorbid rhinitis and asthma have:

- more frequent physician's visits, emergency room visits and hospital admissions for asthma, and higher asthma- related drug expenses

Evidence that treatment improves control and QOL

- Consider LTRA as alternative in step 2
- Use nasal steroids
- Use second gen antihistamines

Immunotherapy may help

Pharmacological Treatment of Allergies

Labels on first generation antihistamines (diphenhydramine) caution people with asthma against using these agents

Newer antihistamines (loratadine, cetirizine, fexofenadine) have little to no anticholinergic properties

Hormonal Changes

Fluctuation in estrogen and progesterone

Day 22 of cycle decline in hormones

- Lowest at day 28 (of 28-day cycle)
  - Airway constriction
  - Activation of inflammatory response
  - Alteration in pulmonary circulation

What to do

- Keep a diary – compare timing of periods to worsening symptoms
- Avoid triggers – be especially cautious during the last week of cycle
- Carry rescue med
- Talk to doctor
- Increase maintenance meds cyclically
- Hormone therapy like BCP

Questions to Consider per Medication Class

 General	How have you been feeling? How often do you feel short of breath?
 Short Acting Beta Agonists	Any tremors? Any heart palpitations?
 Long Acting Beta Agonists	Any headaches? Any cramps?
 Inhaled Corticosteroids	Any changes in your voice? Any mouth thrush?
 Combination Therapy	Any heart palpitations? Any headaches? Any changes in your voice?
 Leukotriene Receptor Antagonists	Any changes in liver function tests?

General Questions and Counseling

What medications do you use for your breathing?

Why is it important to use you controller inhaler every day?

Can you show me how you use your inhaler?

How often do you need to use your rescue inhaler in one week?

What type of exercise do you do?

When did you last receive your flu and pneumonia (if applicable) vaccine?

Assess adherence and potential barriers to adherence (cost, adverse effects, difficulty using inhaler)

The END