



4<sup>th</sup>  
The

Pediatric Congress Professor Amirhakimi

14-17 May 2024-Fars-Shiraz

چهارمین کنگره دوسالانه کودکان استاد امیر حکیمی

۲۵ - ۲۸ اردیبهشت ۱۴۰۳ - فارس - شیراز



انجمن متخصصین کودکان  
استاد فارس

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# Acute Asthma Management In Home And E.R

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Fars Pediatric Association

**چهارمین کنگره دوسالانه**  
**استاد امیر حکیمی**  
The 4<sup>th</sup> Pediatric Congress  
Professor Amirhakimi  
FARS SHIRAZ  
۲۵ اردیبهشت ۱۴۰۳

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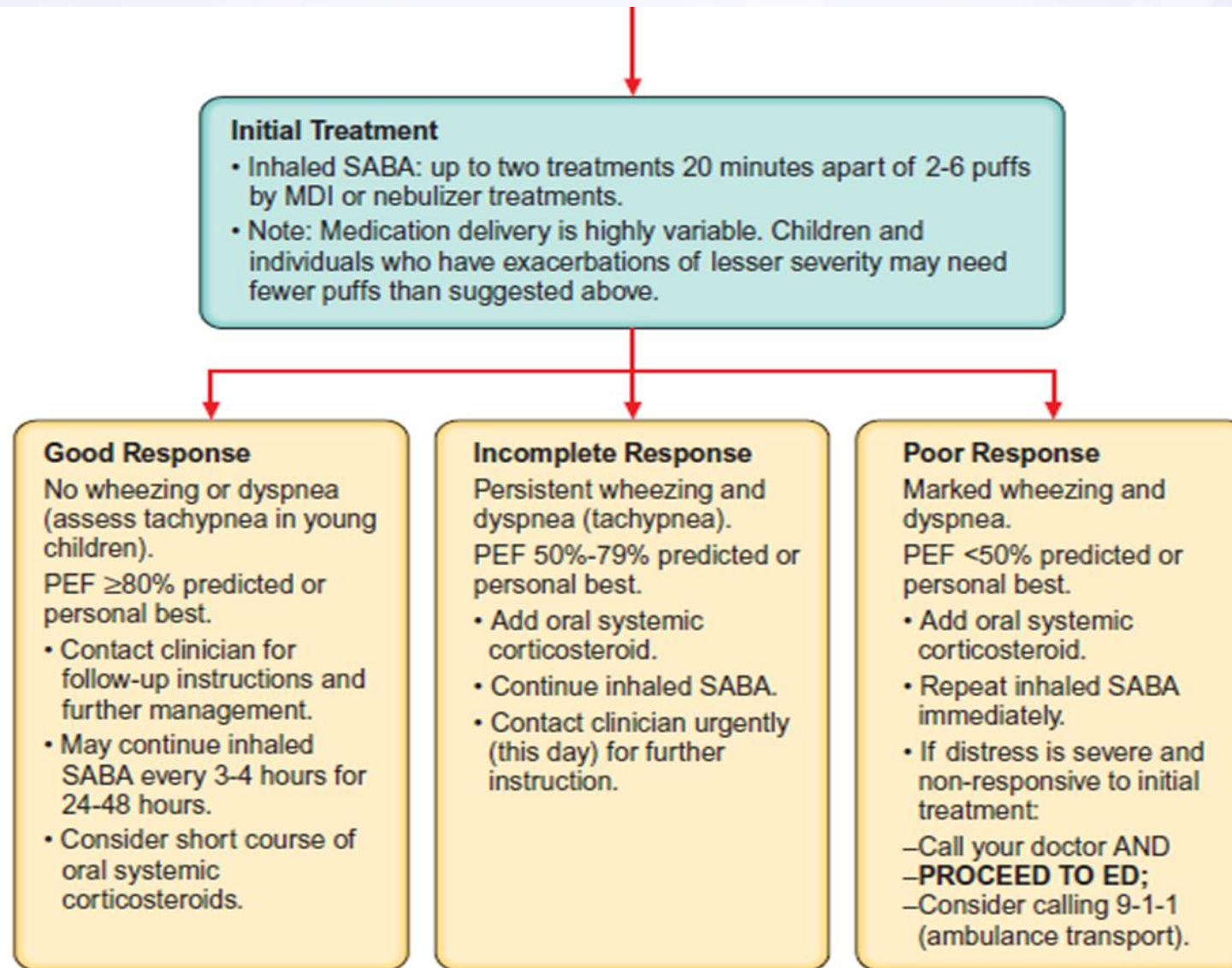
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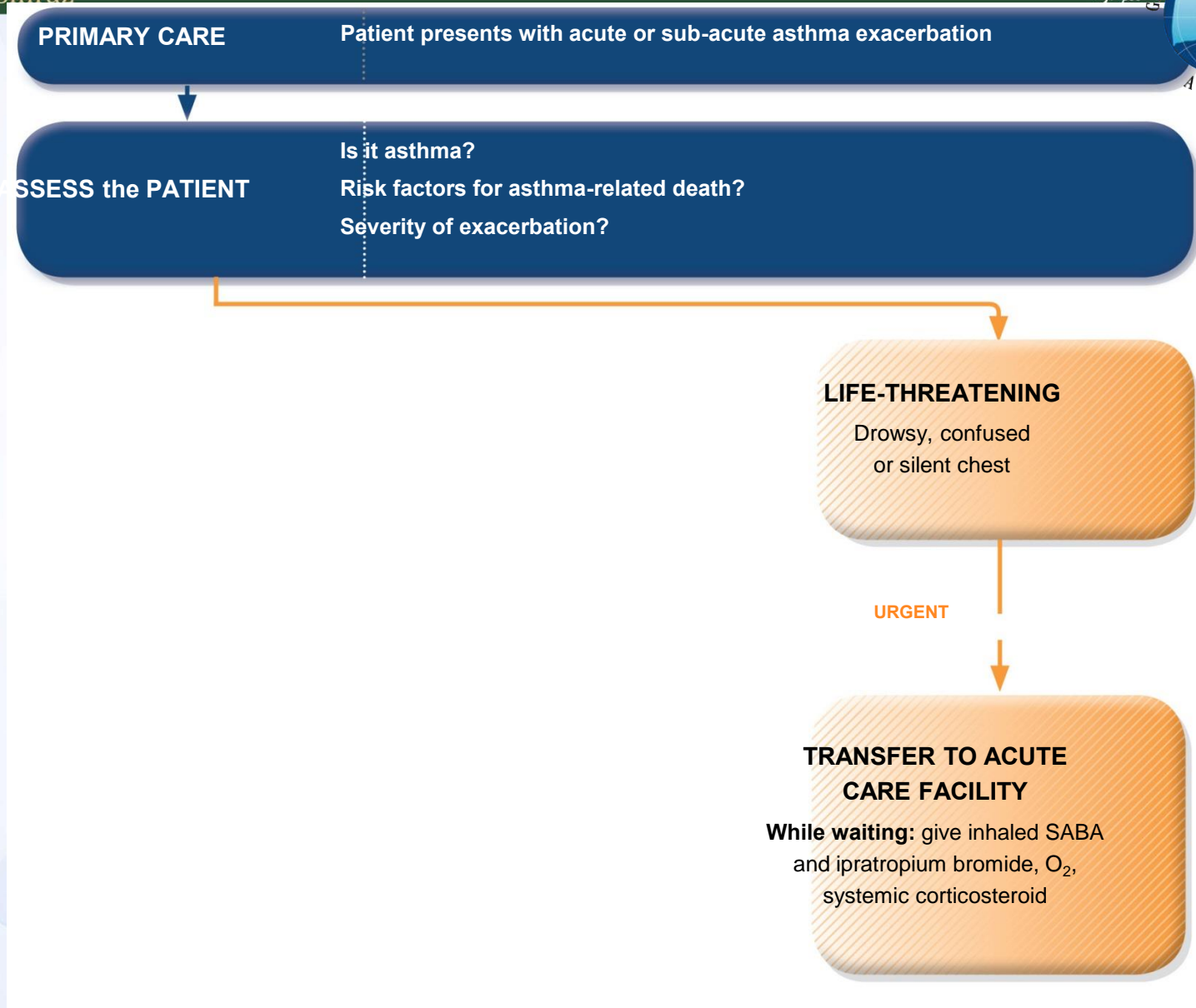


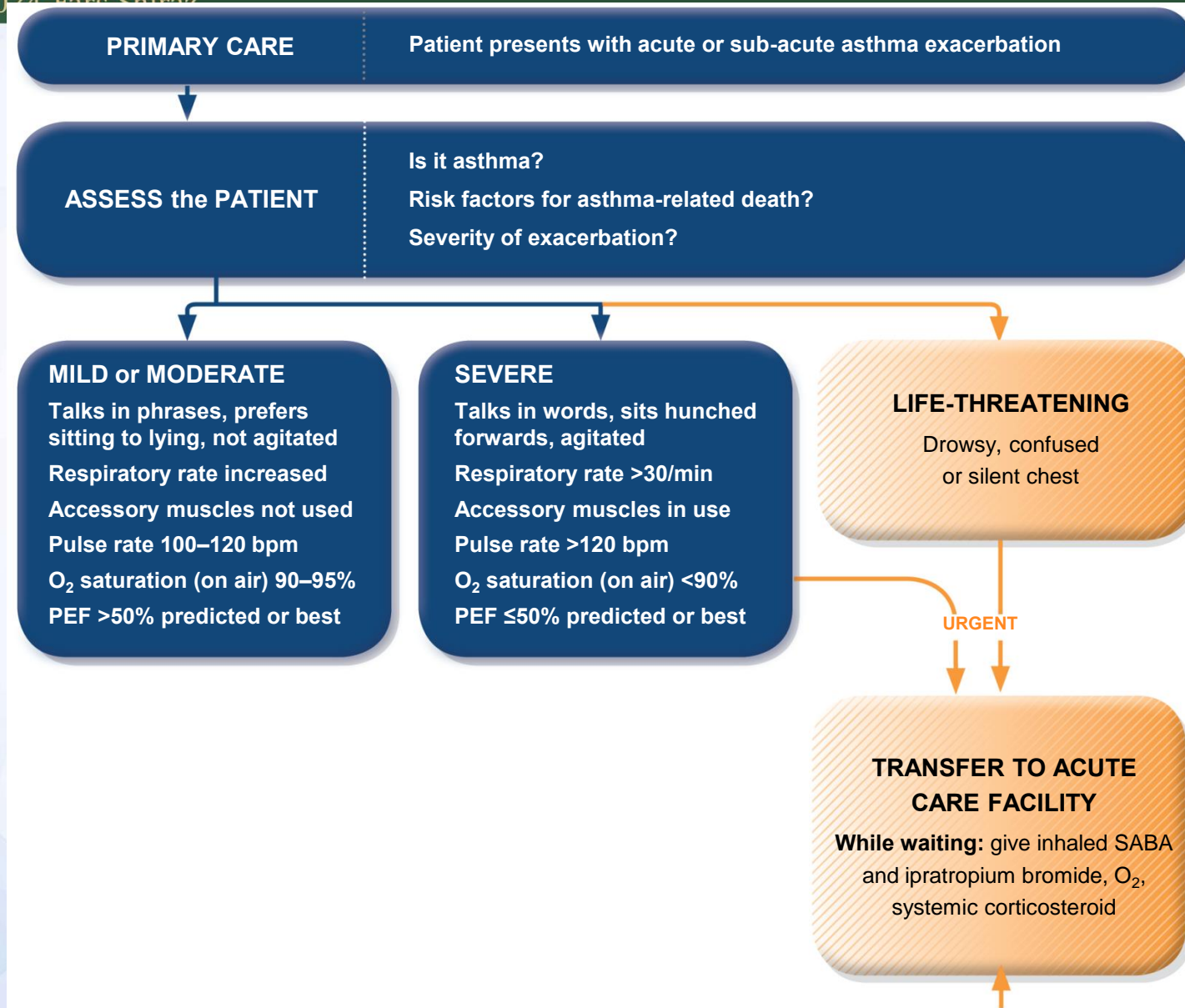
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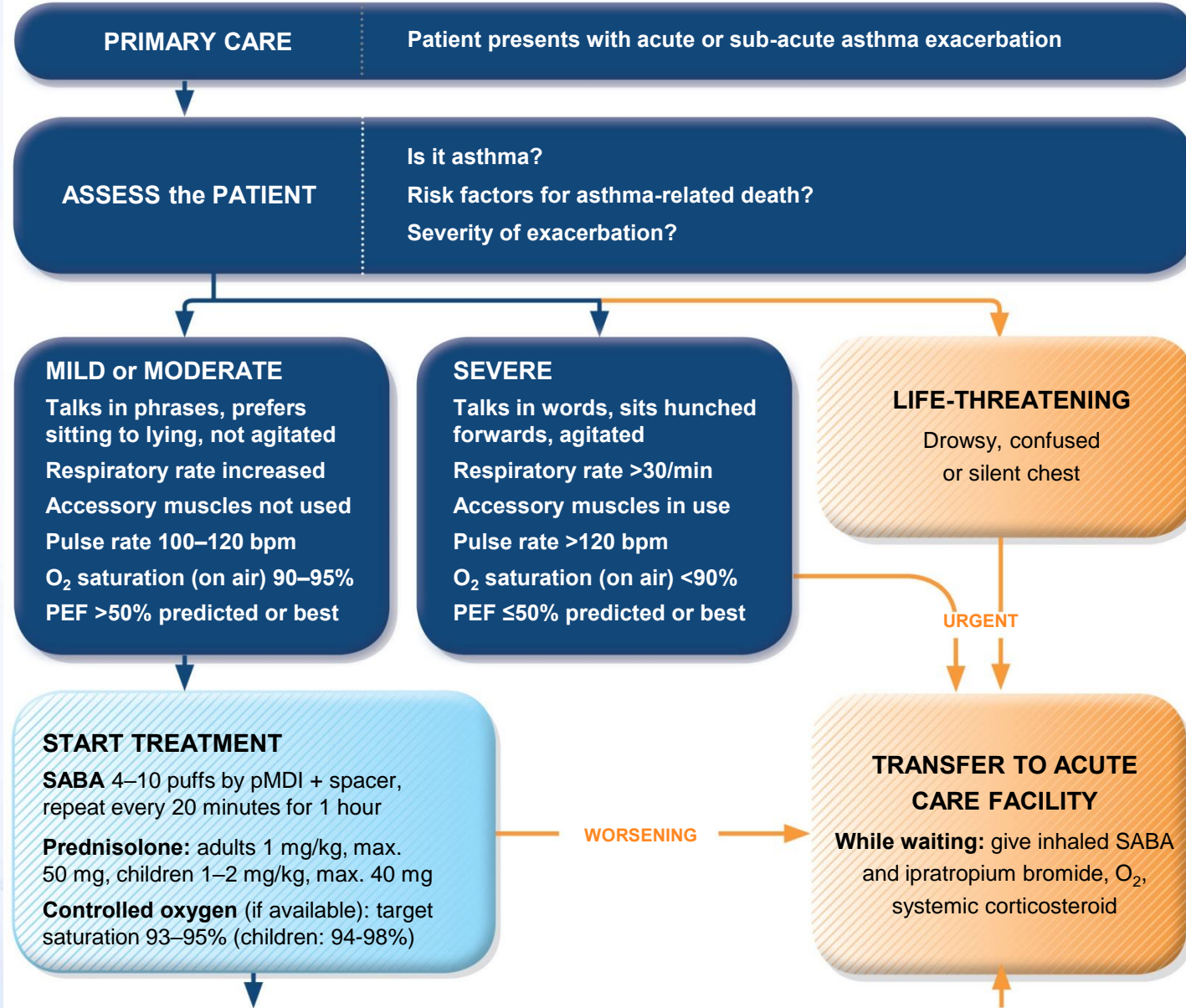
# Home Management of asthma exacerbation

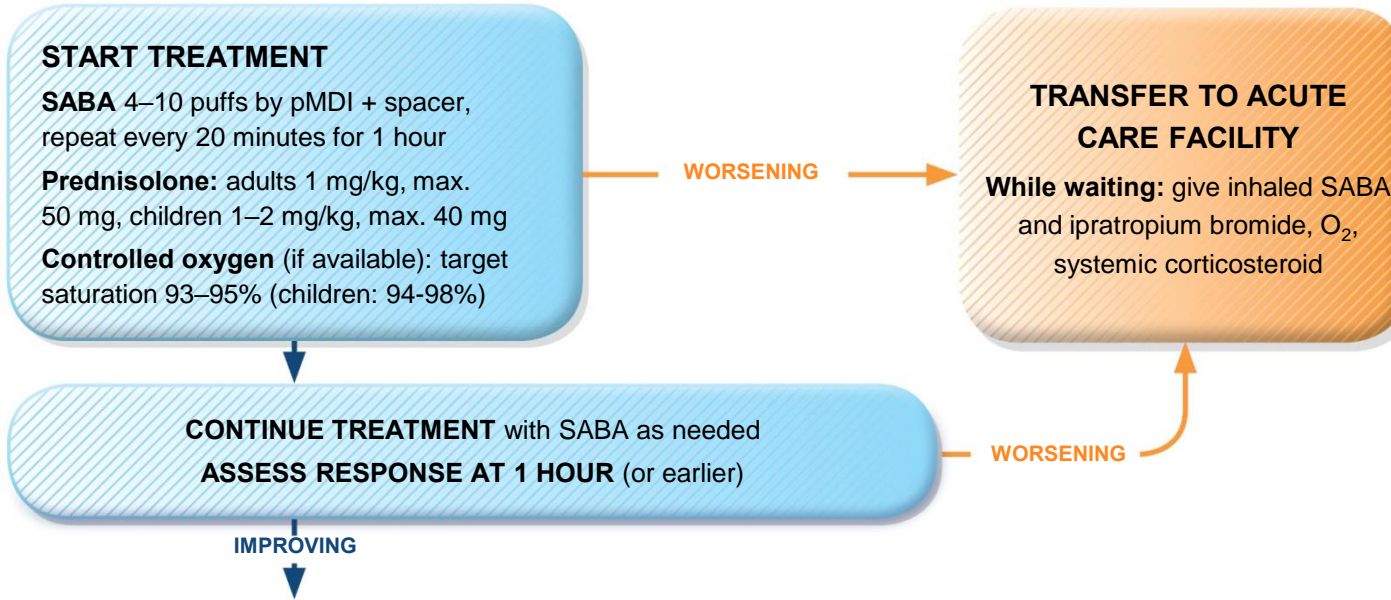


**Figure 56-1** Management of asthma exacerbations: Home treatment. ED, Emergency department; MDI, metered-dose inhaler; PEF, peak expiratory flow; SABA, short-acting  $\beta_2$ -agonist (quick-relief inhaler). (From National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma. Full report 2007. Washington D.C.: US Government Printing Office; 2007.)

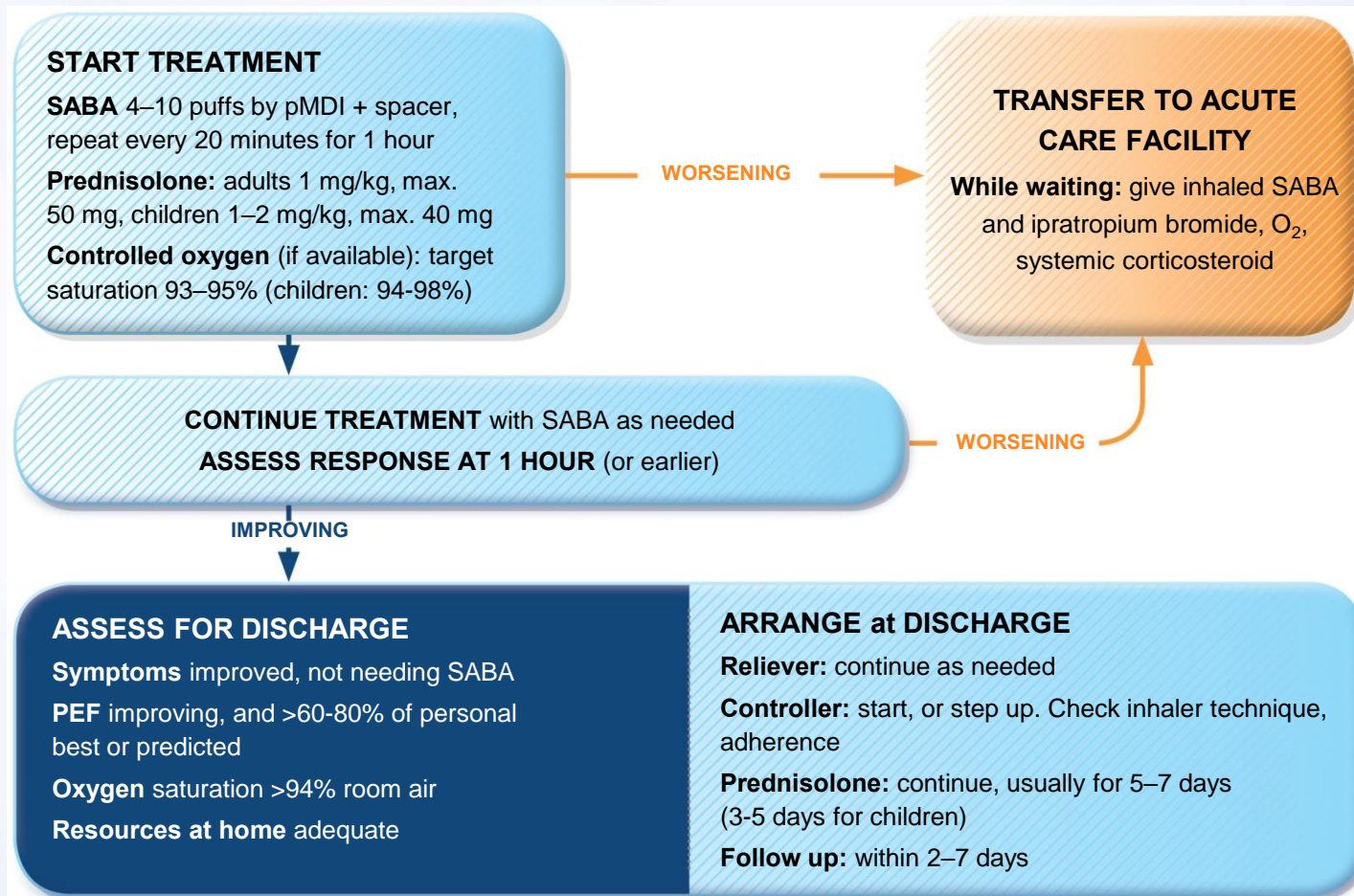


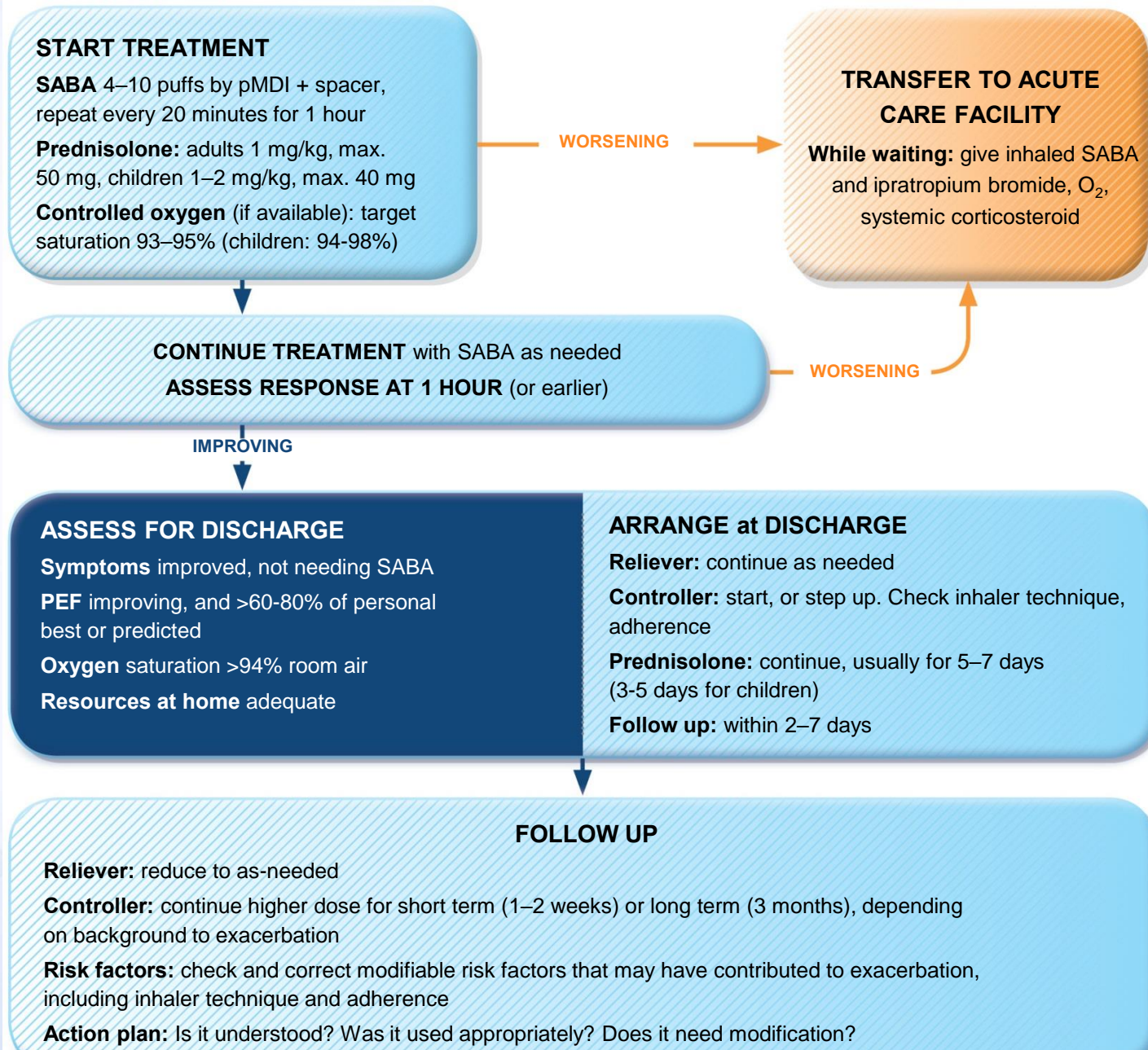






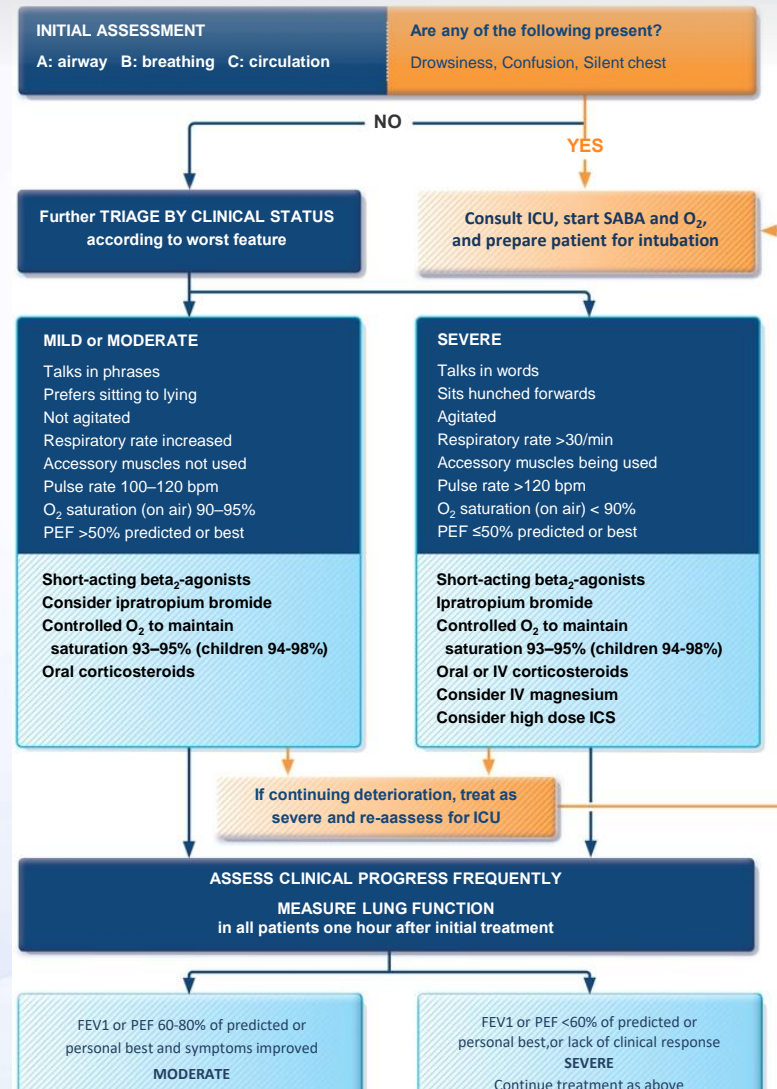


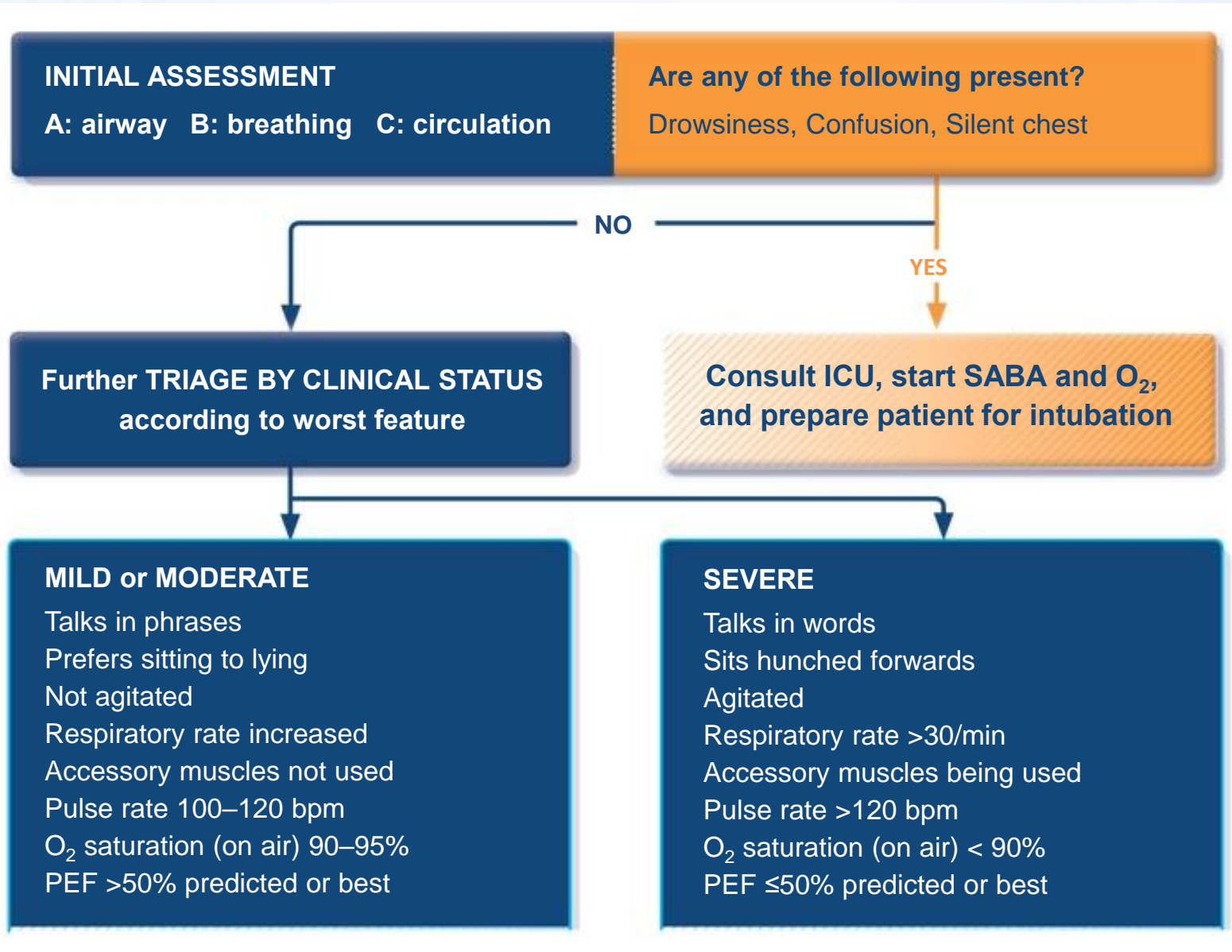






# Managing exacerbations in acute care settings





### **MILD or MODERATE**

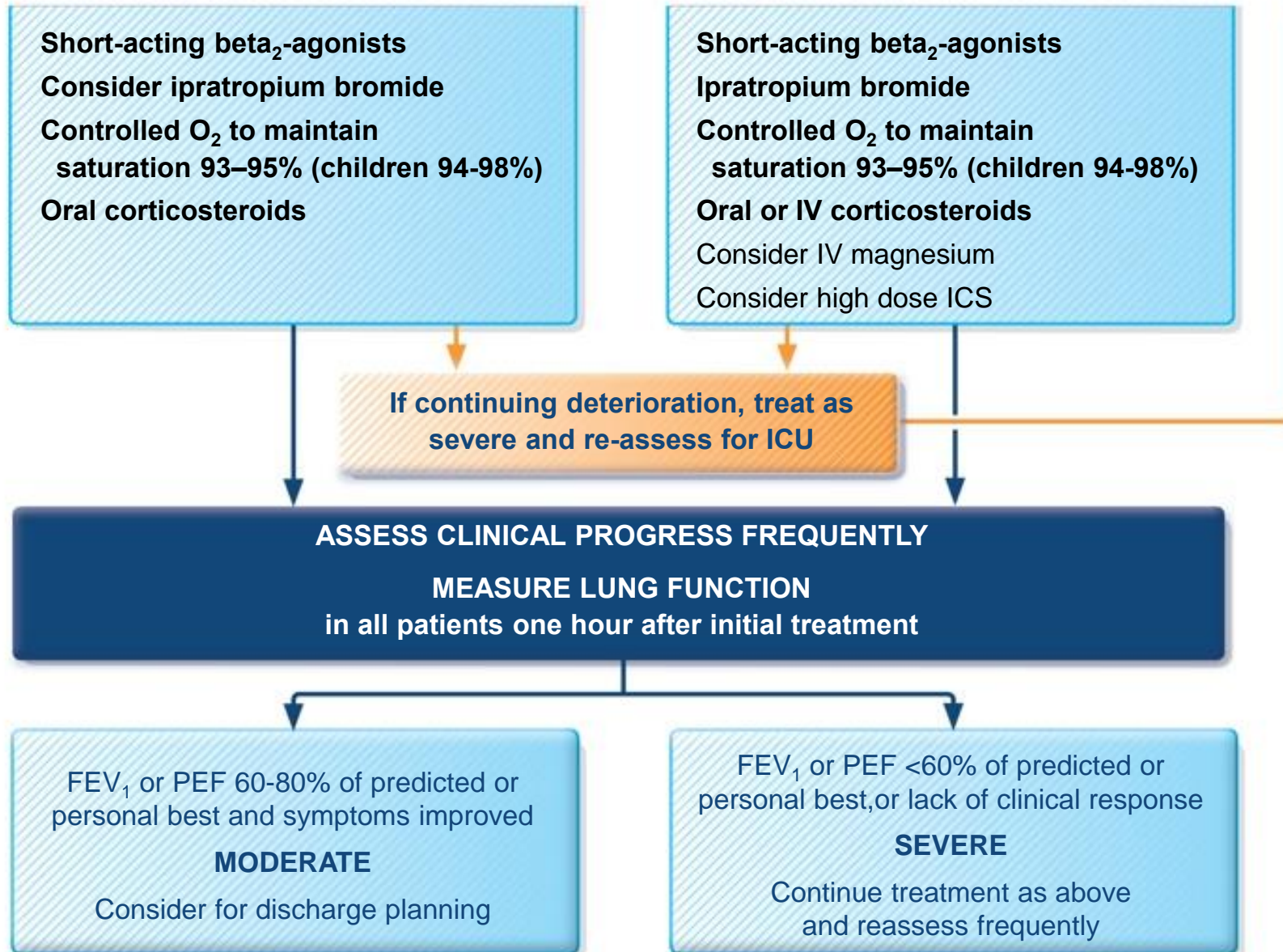
Talks in phrases  
Prefers sitting to lying  
Not agitated  
Respiratory rate increased  
Accessory muscles not used  
Pulse rate 100–120 bpm  
O<sub>2</sub> saturation (on air) 90–95%  
PEF >50% predicted or best

**Short-acting beta<sub>2</sub>-agonists**  
**Consider ipratropium bromide**  
**Controlled O<sub>2</sub> to maintain**  
**saturation 93–95% (children 94-98%)**  
**Oral corticosteroids**

### **SEVERE**

Talks in words  
Sits hunched forwards  
Agitated  
Respiratory rate >30/min  
Accessory muscles being used  
Pulse rate >120 bpm  
O<sub>2</sub> saturation (on air) < 90%  
PEF ≤50% predicted or best

**Short-acting beta<sub>2</sub>-agonists**  
**Ipratropium bromide**  
**Controlled O<sub>2</sub> to maintain**  
**saturation 93–95% (children 94-98%)**  
**Oral or IV corticosteroids**  
Consider IV magnesium  
Consider high dose ICS



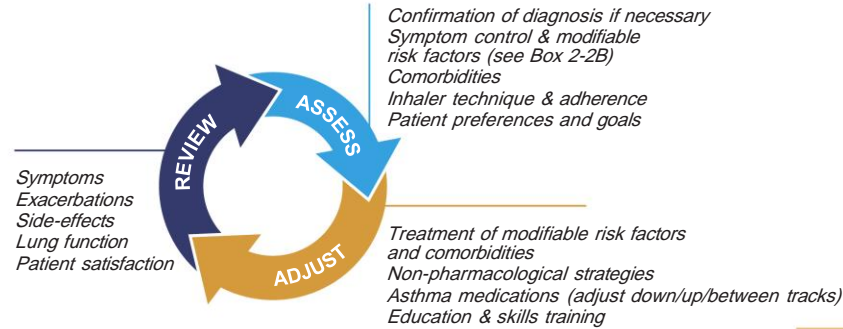
## GINA treatment figure for adults and adolescents ( $\geq 12$ years)

- Treatment options are shown in two tracks
  - This was necessary to clarify how to step treatment up and down with the same reliever
- **Track 1, with low dose ICS-formoterol as the reliever, is the preferred strategy**
  - Preferred because of the evidence that using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever, with similar symptom control and lung function
- **Track 2, with SABA as the reliever, is an 'alternative' (non-preferred) strategy**
  - Less effective than Track 1 for reducing severe exacerbations
  - Use Track 2 if Track 1 is not possible; can also consider Track 2 if a patient has good adherence with their controller, and has had no exacerbations in the last 12 months
  - Before considering a regimen with SABA reliever, consider whether the patient is likely to continue to be adherent with daily controller – if not, they will be exposed to the risks of SABA-only treatment

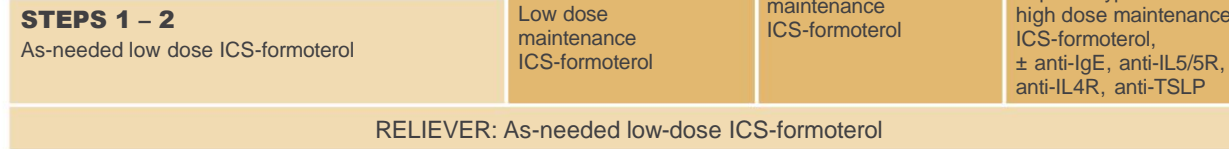
## Adults & adolescents 12+ years

### Personalized asthma management

Assess, Adjust, Review  
for individual patient needs

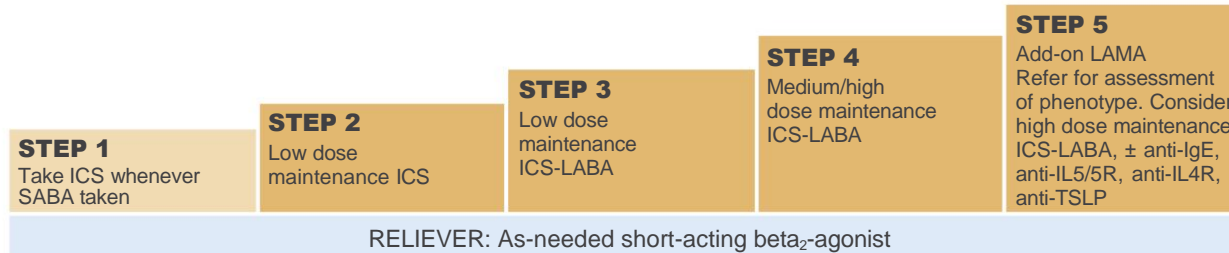


**CONTROLLER and PREFERRED RELIEVER**  
(Track 1). Using ICS-formoterol as reliever reduces the risk of exacerbations compared with using a SABA reliever



See GINA severe asthma guide

**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



Other controller options for either track (limited indications, or less evidence for efficacy or safety)

	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. As last resort consider adding low dose OCS but consider side-effects
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- GINA recommends that asthma in adults and adolescents should not be treated solely with short-acting b2-agonist (SABA), because of the risks of SABA-only treatment and SABA overuse, and evidence for benefit of inhaled corticosteroids (ICS).
- Large trials show that as-needed combination ICS,formoterol reduces severe exacerbations by more than 60% in mild asthma compared with SABA alone.

# Dosages of Drugs for Asthma

## SYSTEMIC (INJECTED) $\beta_2$ -AGONISTS

Epinephrine 1:1000 (1 mg/mL)	0.01 mg/kg up to 0.3-0.5 mg every 20 min for 3 doses SQ	0.3-0.5 mg every 20 min for 3 doses SQ	No proven advantage of systemic therapy over aerosol
Terbutaline (1 mg/mL)	0.01 mg/kg every 20 min for 3 doses SQ, then every 2-6 h as needed	0.25 mg every 20 min for 3 doses SQ	No proven advantage of systemic therapy over aerosol

## ANTICHOLINERGICS IPRATROPIUM BROMIDE

Nebulizer solution (0.25 mg/mL)	0.25-0.5 mg every 20 min for 3 doses, then as needed	0.5 mg every 20 min for 3 doses, then as needed	May mix in same nebulizer with albuterol; should not be used as first-line therapy; should be added to SABA therapy for severe exacerbations; addition of ipratropium not shown to provide further benefit after patient is hospitalized
MDI (18 $\mu$ g/puff)	4-8 puffs every 20 min as needed up to 3 h	8 puffs every 20 min as needed up to 3 h	Should use with VHC and face mask for children <4 yr; studies have examined ipratropium bromide MDI for up to 3 h

## IPRATROPIUM WITH ALBUTEROL

Nebulizer solution (each 3-mL vial contains 0.5 mg ipratropium bromide and 2.5 mg albuterol)	1.5 mL every 20 min for 3 doses, then as needed	3 mL every 20 min for 3 doses, then as needed	May be used for up to 3 h in initial management of severe exacerbations; addition of ipratropium to albuterol not shown to provide further benefit after patient is hospitalized
MDI (each puff contains 18 $\mu$ g ipratropium bromide and 90 $\mu$ g of albuterol)	4-8 puffs every 20 min as needed up to 3 h	8 puffs every 20 min as needed up to 3 h	Should use with VHC and face mask for children <4 yr

# Follow-up after an exacerbation

- Follow up all patients regularly after an exacerbation, until symptoms and lung function return to normal
  - 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 management
- 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

TABLE  
56-1

Dosages of Drugs for Asthma Exacerbations

Medications	DOSAGES		Comments
	Children*	Adults	
<b>INHALED SHORT-ACTING <math>\beta_2</math>-AGONISTS</b>			
<b>ALBUTEROL</b>			
Nebulizer solution (0.63 mg/3 mL, 1.25 mg/3 mL, 2.5 mg/3 mL, 5.0 mg/mL)	0.15 mg/kg (minimum dose, 2.5 mg) every 20 min for 3 doses, then 0.15-0.3 mg/kg up to 10 mg every 1-4 h as needed, or 0.5 mg/kg/h by continuous nebulization	2.5-5 mg every 20 min for 3 doses, then 2.5-10 mg every 1-4 h as needed, or 10-15 mg/h continuously	Only selective $\beta_2$ -agonists are recommended. For optimal delivery, dilute aerosols to minimum of 3 mL at gas flow of 6-8 L/min. Use large-volume nebulizers for continuous administration; may mix with ipratropium nebulizer solution
MDI (90 $\mu$ g/puff)	4-8 puffs every 20 min for 3 doses, then every 1-4 h inhalation maneuver as needed; use VHC; add mask for children <4 yr	4-8 puffs every 20 min up to 4 h, then every 1-4 h as needed	In mild-to-moderate exacerbations, MDI plus VHC is as effective as nebulized therapy with appropriate administration technique and coaching by trained personnel.
<b>BITOLTEROL</b>			
Nebulizer solution (2 mg/mL)	See albuterol dose; thought to be half as potent as albuterol on mg basis	See albuterol dose	Has not been studied in severe asthma exacerbations; do not mix with other drugs
MDI (370 $\mu$ g/puff)	See albuterol MDI dose	See albuterol MDI dose	Has not been studied in severe asthma exacerbations
<b>LEVALBUTEROL (R-ALBUTEROL)</b>			
Nebulizer solution (0.63 mg/3 mL, 1.25 mg/0.5 mL, 1.25 mg/3 mL)	0.075 mg/kg (minimum dose, 1.25 mg) every 20 min for 3 doses, then 0.075-0.15 mg/kg up to 5 mg every 1-4 h as needed	1.25-2.5 mg every 20 min for 3 doses, then 1.25-5 mg every 1-4 h as needed	Levalbuterol administered in one half (mg) of the albuterol dose provides comparable efficacy and safety; has not been evaluated by continuous nebulization
MDI (45 $\mu$ g/puff)	See albuterol MDI dose	See albuterol MDI dose	

TABLE  
56-1

## Dosages of Drugs for Asthma Exacerbations—cont'd

Medications	DOSAGES		Comments
	Children*	Adults	
<b>SYSTEMIC CORTICOSTEROIDS<sup>†</sup></b>			
Prednisone	1 mg/kg in 2 divided doses (maximum, 60 mg/day) until PEF is 70% of predicted or personal best	40-80 mg/day in 1 or 2 divided doses until PEF reaches 70% of predicted or personal best	For outpatient burst, use 40-60 mg in single dose or 2 divided doses for total of 5-10 days in adults (children: 1-2 mg/kg/day maximum, 60 mg/day for 3-10 days)
Methylprednisolone			
Prednisolone			

From National Asthma Education and Prevention Program. Expert panel report 3: guidelines for the diagnosis and management of asthma. Full report 2007. Washington D.C.: US Government Printing Office; 2007.

ED, Emergency department; ICs, inhaled corticosteroids; MDI, metered-dose inhaler; PEF, peak expiratory flow; SABA, short-acting  $\beta_2$ -agonists; VHC, valved holding chamber.

\*Children  $\leq 12$  years of age.

<sup>†</sup>Dosages and comments apply to all three corticosteroids. There is no known advantage for higher doses of corticosteroids in severe asthma exacerbations, nor is there any advantage for intravenous administration over oral therapy if gastrointestinal transit time or absorption is not

# Magnesium Sulfate

- This agent has immediate bronchodilator effects and mild anti inflammatory effects.
- magnesium is safe and effective in patients with severe exacerbations.
- guidelines recommend consideration of intravenous MgSO<sub>4</sub> in patients who have life-threatening exacerbations
- and in those whose exacerbations remains in the severe category after 1 hour of intensive conventional therapy.



# The recommended dose of magnesium sulfate is

2 gr given intravenously over 20 minutes in adults

And 25 to 100 mg/kg in children (total maximum dose of 2 g)

# Written asthma action plans

- All patients should have a written asthma action plan
  - The aim is to show the patient how to recognize and respond to worsening asthma
  - It should be individualized for the patient's medications, level of asthma control and health literacy
  - Based on symptoms and/or PEF (children: only symptoms)
- The action plan should include:
  - The patient's usual asthma medications
  - When/how to increase reliever and controller or start OCS
  - How to access medical care if symptoms fail to respond
- Why?
  - When combined with self-monitoring and regular medical review, action plans are highly effective in reducing asthma mortality and morbidity

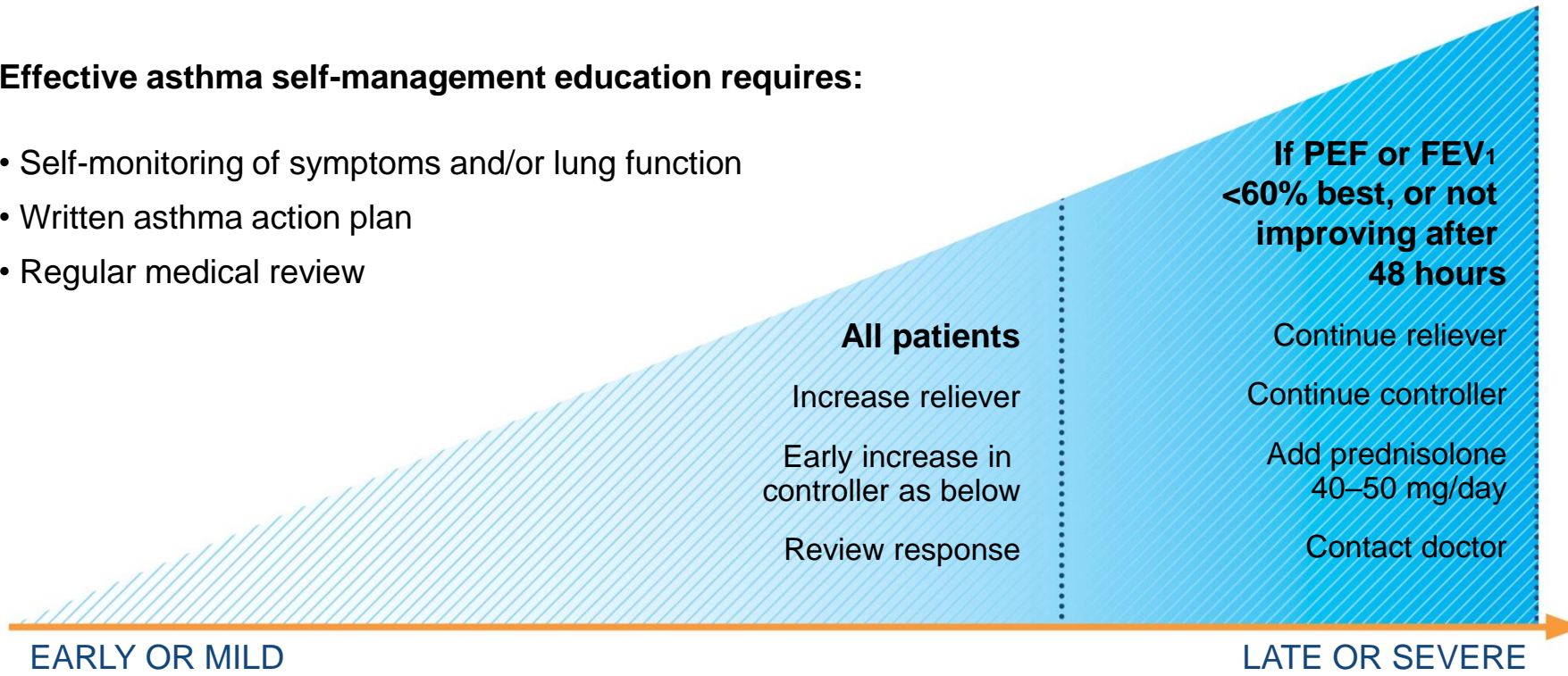


# Written asthma action plans



## Effective asthma self-management education requires:

- Self-monitoring of symptoms and/or lung function
- Written asthma action plan
- Regular medical review



## EMERGENCY DEPARTMENT-DISCHARGE PLAN

Name: \_\_\_\_\_ was seen by Dr. \_\_\_\_\_ on \_\_\_/\_\_\_/\_\_\_

- Take your prescribed medications as directed – do not delay!
- Asthma attacks like this one can be prevented with a long-term treatment plan.
- Even when you feel well, you may need daily medicine to keep your asthma in good control and prevent attacks.
- Visit your doctor or other healthcare provider as soon as you can to discuss how to control your asthma and to develop *your own* action plan.

Your follow-up appointment with \_\_\_\_\_ is on \_\_\_/\_\_\_/\_\_\_ Tel: \_\_\_\_\_

## YOUR MEDICINE FOR THIS ASTHMA ATTACK IS:

Medication	Amount	Doses per day, for # days
Prednisone/prednisolone (oral corticosteroid)		_____ a day for _____ days Take the entire prescription, even when you start to feel better.
Inhaled albuterol		_____ puffs every 4 to 6 hours if you have symptoms, for _____ days.

## YOUR DAILY MEDICINE FOR LONG-TERM CONTROL AND PREVENTING ATTACKS IS:

Medication	Amount	Doses per day
Inhaled corticosteroid		

## YOUR QUICK-RELIEF MEDICINE WHEN YOU HAVE SYMPTOMS IS:

Medication	Amount	Number of doses per day
Inhaled albuterol		

**YOUR QUICK-RELIEF MEDICINE WHEN YOU HAVE SYMPTOMS IS:**

Medication	Amount	Number of doses per day
Inhaled albuterol		

**ASK YOURSELF 2 TO 3 TIMES PER DAY, EVERY DAY, FOR AT LEAST 1 WEEK:**

**'How good is my asthma compared to when I left the hospital?'**

<p><b>If you feel much better:</b></p> <ul style="list-style-type: none"> <li>Take your daily long-term control medicine.</li> </ul>	<p><b>If you feel better, but still need your quick-relief inhaler often:</b></p> <ul style="list-style-type: none"> <li>Take your daily long-term control medicine.</li> <li>See your doctor as soon as possible.</li> </ul>	<p><b>If you feel about the same:</b></p> <ul style="list-style-type: none"> <li>Use your quick-relief inhaler.</li> <li>Take your daily long-term control medicine.</li> <li>See your doctor as soon as possible – don't delay.</li> </ul>	<p><b>If you feel worse:</b></p> <ul style="list-style-type: none"> <li>Use your quick-relief inhaler.</li> <li>Take your daily long-term control medicine.</li> <li>Immediately go to the emergency department or call 9-1-1.</li> </ul>
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**YOUR ASTHMA IS UNDER CONTROL WHEN YOU:**

① Can be active daily and sleep through the night.	② Need fewer than 4 doses of quick-relief medicine in a week.	③ Are free of shortness of breath, wheeze, and cough.	④ Achieve an acceptable 'peak flow' (discuss with your healthcare provider).
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**Figure 56-3** Form for the emergency department's asthma discharge plan. (From Camargo CA Jr, Emond SD, Boulet L, et al. Emergency department asthma discharge plan. Developed at "Asthma education in the adult emergency department: a multidisciplinary consensus conference," New York Academy of Medicine, New York, April 1-5, 2001. Boston: Massachusetts General Hospital; 2001.)



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Thank You

