Classification and Management of Asthma

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AARC Approved 1 CRCE Credit Hour

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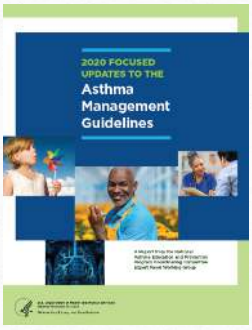
Asthma Guidelines

- 1) NIH EPR 3 2007
  - 2020 NAEPP Focused updates
- 2) GINA – Updated annually



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Learning Objectives

- 1) Describe asthma
- 2) Classify asthma based upon severity
- 3) Recommend treatment options based upon classification.

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Asthma – What is it?

- Asthma is a chronic (long-term) lung disease that inflames and narrows the airways. Asthma causes recurring periods of wheezing, chest tightness, shortness of breath, and coughing. The coughing often occurs at night or early in the morning.

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United States Prevalence CDC 2022

- ≈ 26 million (2022 - CDC)
- 2022 8.2% vs 2001 7.4%
- Sex: Female 10.8% Adult Male = 6.5%
- Race: ↑Blacks, American Indian, & Alaskans
- Income: Lower income = higher risk
- Economic burden = $50-80 Billion annually

https://www.cdc.gov/asthma-data/about/most-recent-asthma-data.html

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Global Prevalence

- Higher income = higher rates

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Causes

The exact cause of asthma isn't known.

- Atopy
- Genetics & family history
- Environmental exposures
- Other influences

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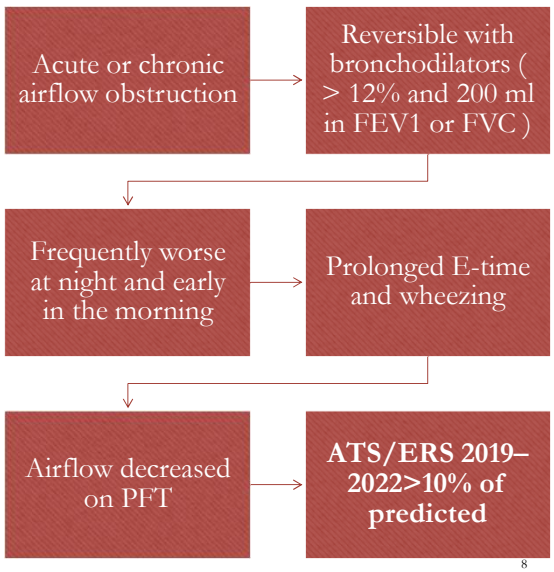
Typical Findings



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Typical Findings

- Inflammatory cell infiltration
  - Eosinophils
  - Neutrophils
  - Lymphocytes
- Goblet cell hyperplasia
  - Thick mucus
  - Plugging

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Typical Findings

- Airway edema
- Mast cell activation
- Bronchial smooth muscle hypertrophy
- Remodeling of the basement membrane
- May be normal between exacerbations

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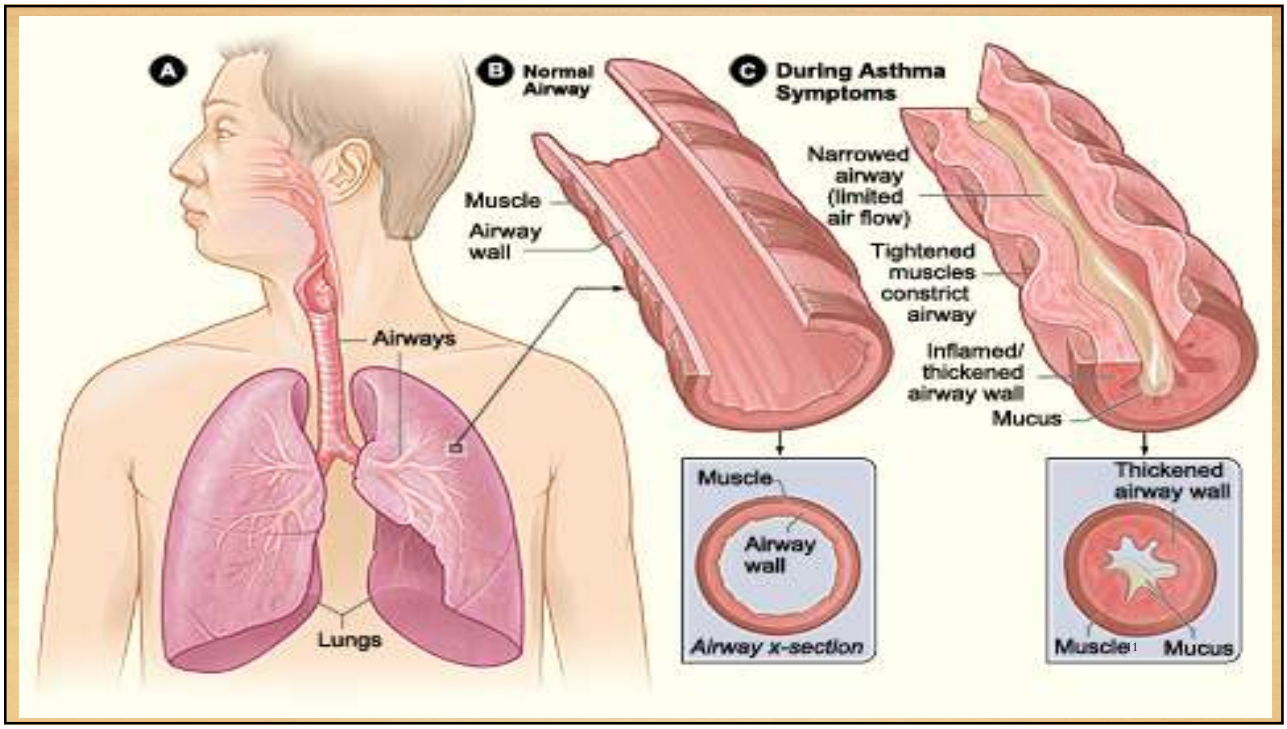

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Keep in Mind

- Signs & symptoms vary widely patient to patient
- Signs & symptoms can vary with the same patient over time

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Classification of Severity - Impairment

- Symptoms
- Nighttime Awakenings
- SABA use
- Activity Interference
- Lung function
  - FEV1
- FEV1% (FEV1/FVC)
- Exacerbations

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FEV1% (FEV1/FVC)

- 2 / 5 = 40% Severe Obstruction
- 2 / 2.2 = 91% Normal or high

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	Components of Severity	Intermittent		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week		
	Nighttime awakenings	0	≤2x/month	
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week		
	Interference with normal activity	None		
	Lung function		Normal FEV_1 between exacerbations	Normal FEV_1 between exacerbations
	→ FEV_1* (% predicted)	Not applicable	>80%	>80%
	→ FEV_1/FVC*		>85%	Normal†
Risk	Asthma exacerbations requiring oral systemic corticosteroids‡	0–1/year		

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	Components of Severity	Intermittent			Persistent		
					Mild		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week			>2 days/week but not daily		
	Nighttime awakenings	0	≤2x/month		1–2x/month	3–4x/month	
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week but not daily	>2 days/week but not daily and not more than once on any day	
	Interference with normal activity	None			Minor limitation		
	Lung function		Normal FEV_1 between exacerbations	Normal FEV_1 between exacerbations			
	→ FEV_1* (% predicted)	Not applicable	>80%	>80%	Not applicable	>80%	>80%
	→ FEV_1/FVC*		>85%	Normal†		>80%	Normal†
Risk	Asthma exacerbations requiring oral systemic corticosteroids‡	0–1/year			≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma	*Generally, more frequent a* ≥2/year	

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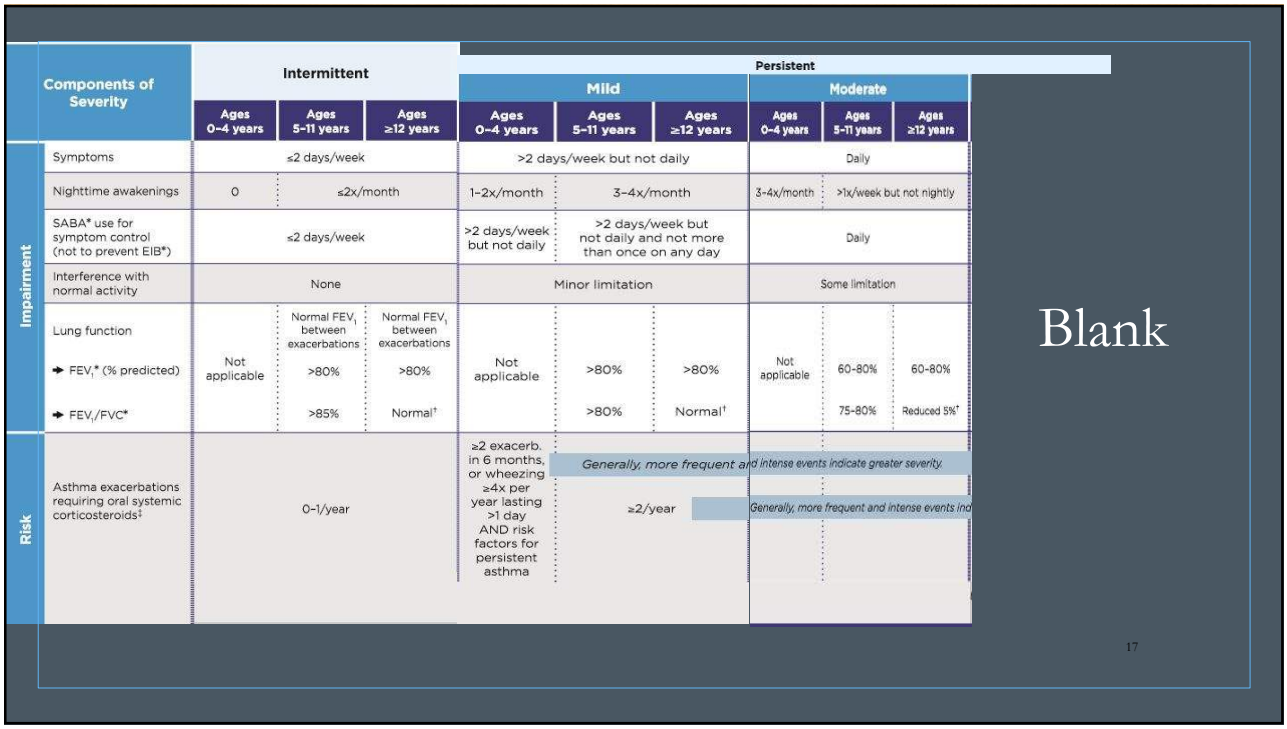
Components of Severity
Intermittent
Persistent
Mild
Moderate
Ages 0–4 years
Ages 5–11 years
Ages ≥12 years
Impairment
Symptoms
≤2 days/week
>2 days/week but not daily
Daily
Nighttime awakenings
0
≤2x/month
1–2x/month
3–4x/month
3–4x/month
>1x/week but not nightly
SABA* use for symptom control (not to prevent EIB*)
≤2 days/week
>2 days/week but not daily
>2 days/week but not daily and not more than once on any day
Daily
Interference with normal activity
None
Minor limitation
Some limitation
Lung function
FEV1* (% predicted)
FEV1/FVC*
Not applicable
Normal FEV1 between exacerbations
>80%
>85%
>80%
Normal†
Not applicable
>80%
>80%
Not applicable
60–80%
75–80%
60–80%
Reduced 5%†
Risk
Asthma exacerbations requiring oral systemic corticosteroids‡
0–1/year
≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma
Generally, more frequent and intense events indicate greater severity.
≥2/year
Generally, more frequent and intense events ind
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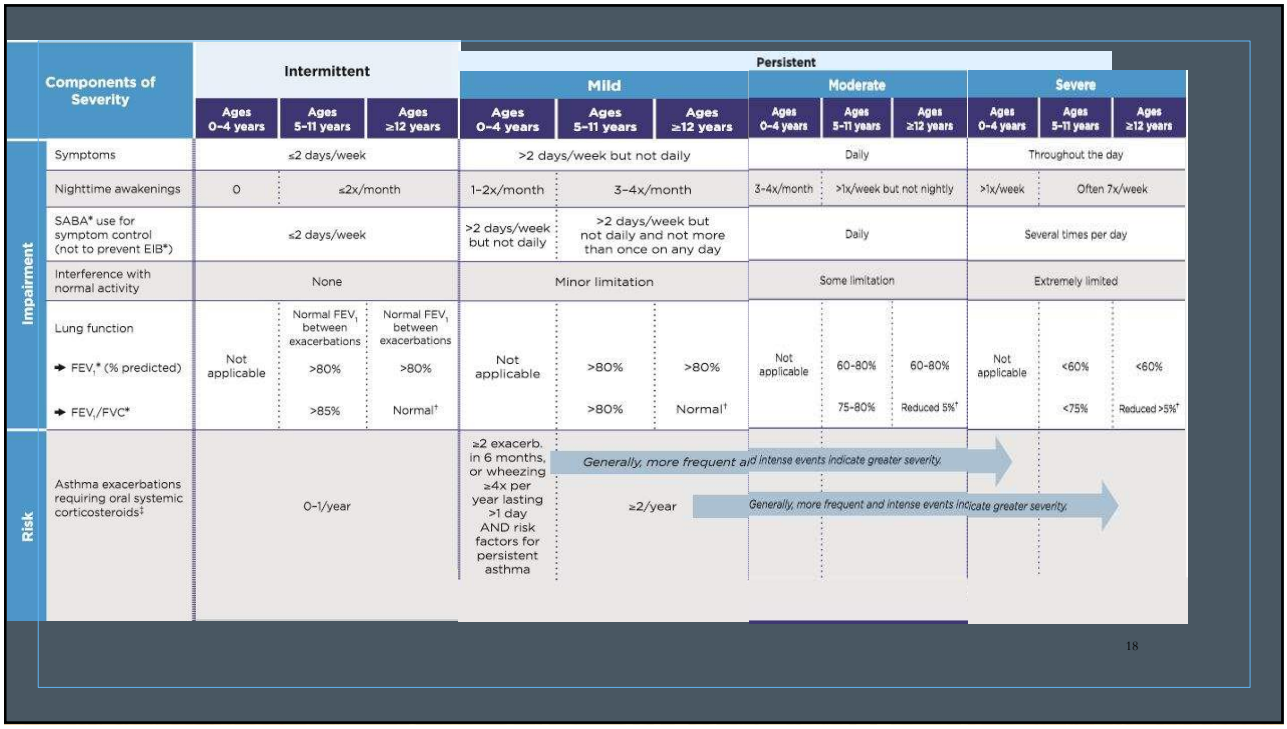
Components of Severity
Intermittent
Persistent
Mild
Moderate
Severe
Ages 0–4 years
Ages 5–11 years
Ages ≥12 years
Impairment
Symptoms
≤2 days/week
>2 days/week but not daily
Daily
Throughout the day
Nighttime awakenings
0
≤2x/month
1–2x/month
3–4x/month
3–4x/month
>1x/week but not nightly
>1x/week
Often 7x/week
SABA* use for symptom control (not to prevent EIB*)
≤2 days/week
>2 days/week but not daily
>2 days/week but not daily and not more than once on any day
Daily
Several times per day
Interference with normal activity
None
Minor limitation
Some limitation
Extremely limited
Lung function
FEV1* (% predicted)
FEV1/FVC*
Not applicable
Normal FEV1 between exacerbations
>80%
>85%
>80%
Normal†
Not applicable
>80%
>80%
Not applicable
60–80%
75–80%
60–80%
Reduced 5%†
Not applicable
<60%
<75%
<60%
Reduced >5%†
Risk
Asthma exacerbations requiring oral systemic corticosteroids‡
0–1/year
≥2 exacerb. in 6 months, or wheezing ≥4x per year lasting >1 day AND risk factors for persistent asthma
Generally, more frequent and intense events indicate greater severity.
≥2/year
Generally, more frequent and intense events indicate greater severity.
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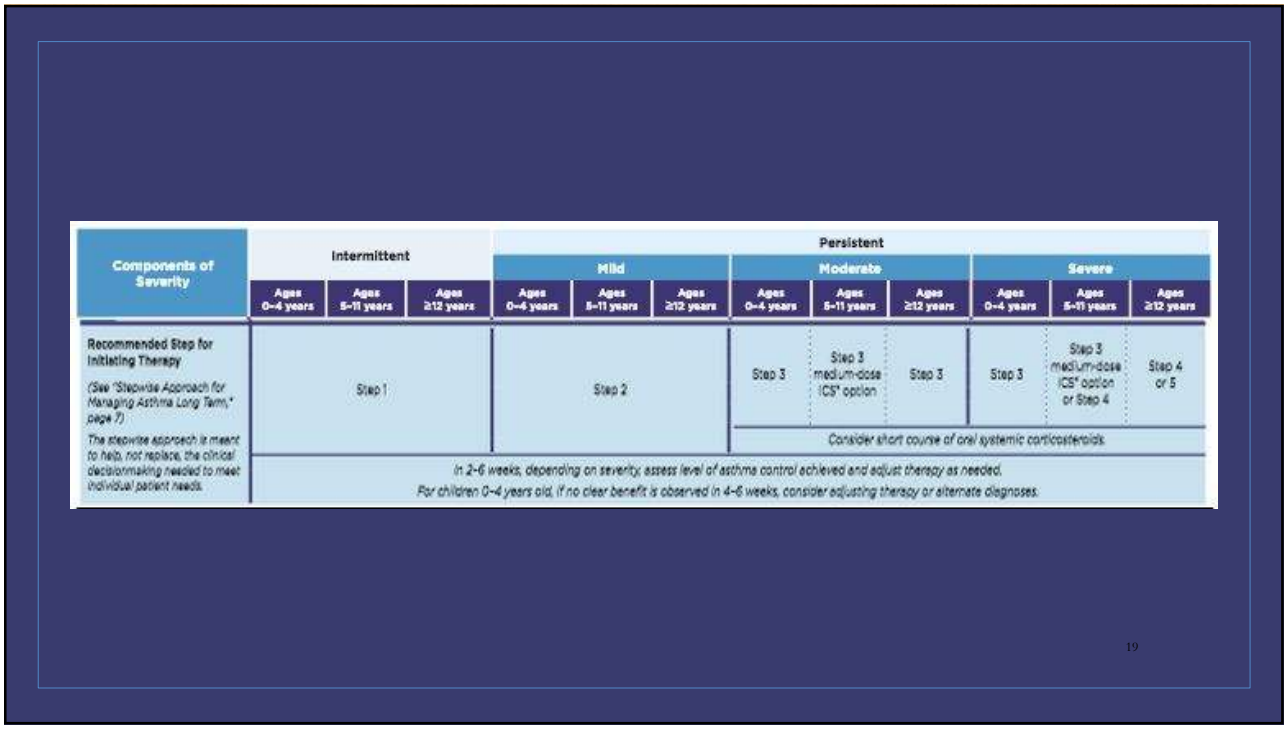

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Stepwise Approach

- Step up if needed
- Step down if possible

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Figure I.b: Stepwise Approach for Management of Asthma in Individuals Ages 0–4 Years

	Intermittent Asthma	Management of Persistent Asthma in Individuals Ages 0–4 Years				
Treatment	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6
Preferred	PRN SABA and At the start of RTI: Add short course daily ICS▲	Daily low-dose ICS and PRN SABA	Daily medium-dose ICS and PRN SABA	Daily medium-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA and PRN SABA	Daily high-dose ICS-LABA + oral systemic corticosteroid and PRN SABA
Alternative		Daily montelukast* or Cromolyn,* and PRN SABA		Daily medium-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast* and PRN SABA	Daily high-dose ICS + montelukast*+ oral systemic corticosteroid and PRN SABA
			For children age 4 years only, see Step 3 and Step 4 on Management of Persistent Asthma in Individuals Ages 5–11 Years diagram.			

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Figure I.c: Stepwise Approach for Management of Asthma in Individuals Ages 5–11 Years

	Intermittent Asthma	Management of Persistent Asthma in Individuals 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 ICS-formoterol▲	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
		Steps 2–4: Conditionally recommend the use of subcutaneous immunotherapy as an adjunct treatment to standard pharmacotherapy in individuals ≥ 5 years of age whose asthma is controlled at the initiation, build up, and maintenance phases of immunotherapy▲			Consider Omalizumab**▲	

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Figure I.d: Stepwise Approach for Management of Asthma in Individuals Ages 12 Years and Older

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

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Components of Control		Well Controlled: Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week
	Nighttime awakenings	≤1x/month		≤2x/month
	Interference with normal activity	None		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week		
	Lung function ➧ FEV_1* (% *predicted*) or peak flow (% *personal best*)	Not applicable	>80%	>80%
	➧ FEV_1/FVC*		>80%	Not applicable
	Validated questionnaires† ➧ ATAQ* ➧ ACQ* ➧ ACT*	Not applicable	Not applicable	0 ≤0.75‡ ≥20
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0–1/year		
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.	
	Treatment-related adverse effects	*Medicatio* *The level of intensity does*		
Recommended Action for Treatment *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		*Maintain current step.* *Regular follow-up every 1–6 months.* *Consider step down if well controlled for at least 3 months.*		

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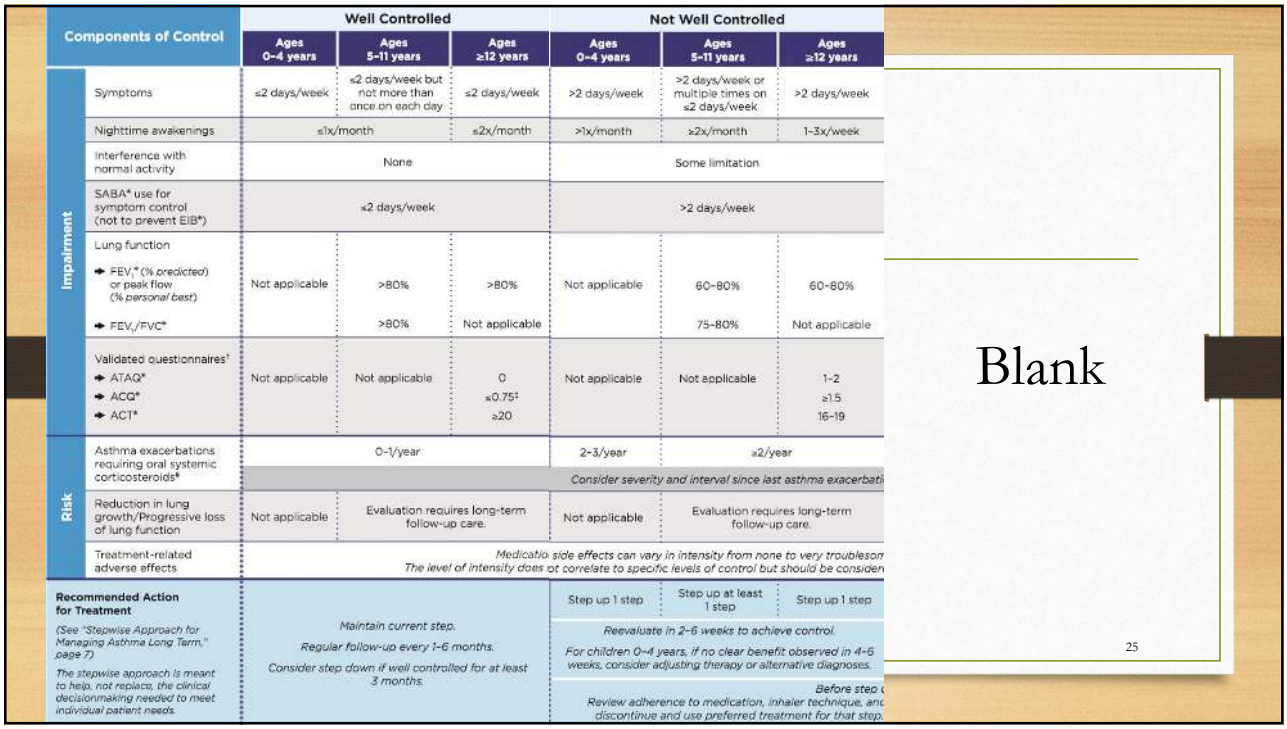

Components of Control		Well Controlled			Not Well Controlled		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week
	Nighttime awakenings	≤1x/month		≤2x/month	>1x/month	≥2x/month	1–3x/week
	Interference with normal activity	None			Some limitation		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week		
	Lung function						
	➧ FEV_1* (% predicted) or peak flow (% personal best)	Not applicable	>80%	>80%	Not applicable	60–80%	60–80%
	➧ FEV_1/FVC*		>80%	Not applicable		75–80%	Not applicable
	Validated questionnaires†						
	➧ ATAQ*	Not applicable	Not applicable	0	Not applicable	Not applicable	1–2
	➧ ACQ*			≤0.75‡			≥1.5
	➧ ACT*			≥20			16–19
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0–1/year			2–3/year	≥2/year	
		Consider severity and interval since last asthma exacerbati					
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.	
	Treatment-related adverse effects	*Medicatio side effects can vary in intensity from none to very troublesor The level of intensity does ot correlate to specific levels of control but should be consider*					
Recommended Action for Treatment *(See "Stepwise Approach for Managing Asthma Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		*Maintain current step. Regular follow-up 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	Step up 1 step
					Reevaluate in 2–6 weeks to achieve control. For children 0–4 years, if no clear benefit observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.		
					Before step Review adherence to medication, inhaler technique, an discontinue and use preferred treatment for that step.		

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Components of Control		Well Controlled			Not Well Controlled			Very Poorly Controlled		
		Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years	Ages 0–4 years	Ages 5–11 years	Ages ≥12 years
Impairment	Symptoms	≤2 days/week	≤2 days/week but not more than once on each day	≤2 days/week	>2 days/week	>2 days/week or multiple times on ≤2 days/week	>2 days/week	Throughout the day		
	Nighttime awakenings	≤1x/month		≤2x/month	>1x/month	≥2x/month	1–3x/week	>1x/week	≥2x/week	≥4x/week
	Interference with normal activity	None			Some limitation			Extremely limited		
	SABA* use for symptom control (not to prevent EIB*)	≤2 days/week			>2 days/week			Several times per day		
	Lung function									
	➧ FEV_1* (% predicted) or peak flow (% personal best)	Not applicable	>80%	>80%	Not applicable	60–80%	60–80%	Not applicable	<60%	<60%
	➧ FEV_1/FVC*		>80%	Not applicable		75–80%	Not applicable		<75%	Not applicable
	Validated questionnaires†									
	➧ ATAQ*	Not applicable	Not applicable	0	Not applicable	Not applicable	1–2	Not applicable	Not applicable	3–4
	➧ ACQ*			≤0.75‡			≥1.5			Not applicable
	➧ ACT*			≥20			16–19			≤15
Risk	Asthma exacerbations requiring oral systemic corticosteroids§	0–1/year			2–3/year	≥2/year		>3/year	≥2/year	
		Consider severity and interval since last asthma exacerbation.								
	Reduction in lung growth/Progressive loss of lung function	Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.		Not applicable	Evaluation requires long-term follow-up care.	
	Treatment-related adverse effects	*Medicatio side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does ot 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 Long Term," page 7)* *The stepwise approach is meant to help, not replace, the clinical decisionmaking needed to meet individual patient needs.*		*Maintain current step. Regular follow-up 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	Step up 1 step	*Consider short course of oral systemic corticosteroids. Step up 1–2 steps. Reevaluate in 2 weeks to achieve control.*		
					Reevaluate in 2–6 weeks to achieve control. For children 0–4 years, if no clear benefit observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.					
					Before step p in treatment: Review adherence to medication, inhaler technique, an environmental control. If alternative treatment was used, discontinue and use preferred treatment for that step. For side effects, consider alternative treatment options.					

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	0–4 years of age		
Daily Dose	**Low**	**Medium***	**High***
MEDICATION			
Beclomethasone MDI†	N/A	N/A	N/A
40 mcg/puff			
80 mcg/puff			
Budesonide DPI†	N/A	N/A	N/A
90 mcg/inhalation			
180 mcg/ inhalation			
Budesonide Nebules	0.25–0.5 mg	>0.5–1.0 mg	>1.0 mg
0.25 mg	1–2 nebs†/day		
0.5 mg	1 neb†/day	2 nebs†/day	3 nebs†/day
1.0 mg		1 neb†/day	2 nebs†/day
Ciclesonide MDI†	N/A	N/A	N/A
80 mcg/puff			
160 mcg/puff			
Flunisolide MDI†	N/A	N/A	N/A
80 mcg/puff			

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	0–4 years of age			5–11 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION						
Beclomethasone MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg
40 mcg/puff				1–2 puffs 2x/day	3–4 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	≥3 puffs 2x/day
Budesonide DPI†	N/A	N/A	N/A	180–360 mcg	>360–720 mcg	>720 mcg
90 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day	
180 mcg/ inhalation					2 inhs† 2x/day	≥3 inhs† 2x/day
Budesonide Nebules	0.25–0.5 mg	>0.5–1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg
0.25 mg	1–2 nebs†/day			1 neb† 2x/day		
0.5 mg	1 neb†/day	2 nebs†/day	3 nebs†/day	1 neb†/day	1 neb† 2x/day	
1.0 mg		1 neb†/day	2 nebs†/day		1 neb†/day	1 neb† 2x/day
Ciclesonide MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg
80 mcg/puff				1–2 puffs/day	1 puff am, 2 puffs pm– 2 puffs 2x/day	≥3 puffs 2x/day
160 mcg/puff				1 puff/day	1 puff 2x/day	≥2 puffs 2x/day
Flunisolide MDI†	N/A	N/A	N/A	160 mcg	320–480 mcg	≥480 mcg
80 mcg/puff				1 puff 2x/day	2–3 puffs 2x/day	≥4 puffs 2x/day

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	0–4 years of age			5–11 years of age			≥12 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION									
Beclomethasone MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg	80–240 mcg	>240–480 mcg	>480 mcg
40 mcg/puff				1–2 puffs 2x/day	3–4 puffs 2x/day		1–3 puffs 2x/day	4–6 puffs 2x/day	
80 mcg/puff				1 puff 2x/day	2 puffs 2x/day	≥3 puffs 2x/day	1 puff am, 2 puffs pm	2–3 puffs 2x/day	≥4 puffs 2x/day
Budesonide DPI†	N/A	N/A	N/A	180–360 mcg	>360–720 mcg	>720 mcg	180–540 mcg	>540–1,080 mcg	>1,080 mcg
90 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day		1–3 inhs† 2x/day		
180 mcg/ inhalation					2 inhs† 2x/day	≥3 inhs† 2x/day	1 inh† am, 2 inhs† pm	2–3 inhs† 2x/day	≥4 inhs† 2x/day
Budesonide Nebules	0.25–0.5 mg	>0.5–1.0 mg	>1.0 mg	0.5 mg	1.0 mg	2.0 mg	N/A	N/A	N/A
0.25 mg	1–2 nebs†/day			1 neb† 2x/day					
0.5 mg	1 neb†/day	2 nebs†/day	3 nebs†/day	1 neb†/day	1 neb† 2x/day				
1.0 mg		1 neb†/day	2 nebs†/day		1 neb†/day	1 neb† 2x/day			
Ciclesonide MDI†	N/A	N/A	N/A	80–160 mcg	>160–320 mcg	>320 mcg	160–320 mcg	>320–640 mcg	>640 mcg
80 mcg/puff				1–2 puffs/day	1 puff am, 2 puffs pm– 2 puffs 2x/day	≥3 puffs 2x/day	1–2 puffs 2x/day	3–4 puffs 2x/day	
160 mcg/puff				1 puff/day	1 puff 2x/day	≥2 puffs 2x/day		2 puffs 2x/day	≥3 puffs 2x/day
Flunisolide MDI†	N/A	N/A	N/A	160 mcg	320–480 mcg	≥480 mcg	320 mcg	>320–640 mcg	>640 mcg
80 mcg/puff				1 puff 2x/day	2–3 puffs 2x/day	≥4 puffs 2x/day	2 puffs 2x/day	3–4 puffs 2x/day	≥5 puffs 2x/day

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	0–4 years of age		
Daily Dose	**Low**	**Medium***	**High***
MEDICATION			
Fluticasone MDI†	176 mcg	>176–352 mcg	>352 mcg
44 mcg/puff	2 puffs 2x/day	3–4 puffs 2x/day	
110 mcg/puff		1 puff 2x/day	≥2 puffs 2x/day
220 mcg/puff			
Fluticasone DPI†	N/A	N/A	N/A
50 mcg/inhalation			
100 mcg/inhalation			
250 mcg/inhalation			
Mometasone DPI†	N/A	N/A	N/A
110 mcg/inhalation			
220 mcg/inhalation			

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	0–4 years of age			5–11 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION						
Fluticasone MDI†	176 mcg	>176–352 mcg	>352 mcg	88–176 mcg	>176–352 mcg	>352 mcg
44 mcg/puff	2 puffs 2x/day	3–4 puffs 2x/day		1–2 puffs 2x/day	3–4 puffs 2x/day	
110 mcg/puff		1 puff 2x/day	≥2 puffs 2x/day		1 puff 2x/day	≥2 puffs 2x/day
220 mcg/puff						
Fluticasone DPI†	N/A	N/A	N/A	100–200 mcg	>200–400 mcg	>400 mcg
50 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day	
100 mcg/inhalation				1 inh† 2x/day	2 inhs† 2x/day	>2 inhs† 2x/day
250 mcg/inhalation						1 inh† 2x/day
Mometasone DPI†	N/A	N/A	N/A	110 mcg	220–440 mcg	>440 mcg
110 mcg/inhalation				1 inh†/day	1–2 inhs† 2x/day	≥3 inhs† 2x/day
220 mcg/inhalation					1–2 inhs†/day	≥3 inhs† divided in 2 doses

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	0–4 years of age			5–11 years of age			≥12 years of age		
Daily Dose	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***	**Low**	**Medium***	**High***
MEDICATION									
Fluticasone MDI†	176 mcg	>176–352 mcg	>352 mcg	88–176 mcg	>176–352 mcg	>352 mcg	88–264 mcg	>264–440 mcg	>440 mcg
44 mcg/puff	2 puffs 2x/day	3–4 puffs 2x/day		1–2 puffs 2x/day	3–4 puffs 2x/day		1–3 puffs 2x/day		
110 mcg/puff		1 puff 2x/day	≥2 puffs 2x/day		1 puff 2x/day	≥2 puffs 2x/day		2 puffs 2x/day	3 puffs 2x/day
220 mcg/puff								1 puffs 2x/day	≥2 puffs 2x/day
Fluticasone DPI†	N/A	N/A	N/A	100–200 mcg	>200–400 mcg	>400 mcg	100–300 mcg	>300–500 mcg	>500 mcg
50 mcg/inhalation				1–2 inhs† 2x/day	3–4 inhs† 2x/day		1–3 inhs† 2x/day		
100 mcg/inhalation				1 inh† 2x/day	2 inhs† 2x/day	>2 inhs† 2x/day		2 inhs† 2x/day	≥3 inhs† 2x/day
250 mcg/inhalation						1 inh† 2x/day		1 inh† 2x/day	≥2 inhs† 2x/day
Mometasone DPI†	N/A	N/A	N/A	110 mcg	220–440 mcg	>440 mcg	110–220 mcg	>220–440 mcg	>440 mcg
110 mcg/inhalation				1 inh†/day	1–2 inhs† 2x/day	≥3 inhs† 2x/day	1–2 inhs† pm	3–4 inhs† pm or 2 inhs† 2x/day	≥3 inhs† 2x/day
220 mcg/inhalation					1–2 inhs†/day	≥3 inhs† divided in 2 doses	1 inh† pm	1 inh† 2x/day or 2 inhs† pm [32]	≥3 inhs† divided in 2 doses

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Medication	0–4 years of age	5–11 years of age	≥12 years of age
Combined Medication (inhaled corticosteroid + long-acting beta$_2$-agonist)			
Fluticasone/Salmeterol — DPI† 100 mcg/50 mcg, 250 mcg/50 mcg, or 500 mcg/50 mcg MDI† 45 mcg/21 mcg, 115 mcg/21 mcg, or 230 mcg/21 mcg	N/A†	1 inhalation 2x/day; dose depends on level of severity or control	1 inhalation 2x/day; dose depends on level of severity or control
Budesonide/Formoterol — MDI† 80 mcg/4.5 mcg or 160 mcg/4.5 mcg	N/A†	2 puffs 2x/day; dose depends on level of severity or control	2 puffs 2x/day; dose depends on level of severity or control
Mometasone/Formoterol — MDI† 100 mcg/5 mcg	N/A†	N/A†	2 inhalations 2x/day; dose depends on severity of asthma

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Medication	0–4 years of age	5–11 years of age	≥12 years of age
Leukotriene Modifiers			
Leukotriene Receptor Antagonists (LTRAs) Montelukast — 4 mg or 5 mg chewable tablet, 4 mg granule packets, 10 mg tablet	4 mg every night at bedtime (1–5 years of age)	5 mg every night at bedtime (6–14 years of age)	10 mg every night at bedtime
Zafirlukast — 10 mg or 20 mg tablet *Take at least 1 hour before or 2 hours after a meal. Monitor liver function.*	N/A†	10 mg 2x/day (7–11 years of age)	40 mg daily (20 mg tablet 2x/day)
5-Lipoxygenase Inhibitor Zileuton — 600 mg tablet *Monitor liver function.*	N/A†	N/A†	2,400 mg daily (give 1 tablet 4x/day)

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Medication	0–4 years of age	5–11 years of age	≥12 years of age
Immunomodulators			
Omalizumab (Anti IgE†) — Subcutaneous injection, 150 mg/1.2 mL following reconstitution with 1.4 mL sterile water for injection *Monitor patients after injections; be prepared to treat anaphylaxis that may occur.*	N/A†	N/A†	150–375 mg subcutaneous every 2–4 weeks, depending on body weight and pretreatment serum IgE level
Cromolyn			
Cromolyn — Nebulizer: 20 mg/ampule	1 ampule 4x/day, N/A† <2 years of age	1 ampule 4x/day	1 ampule 4x/day
Methylxanthines			
Theophylline — Liquids, sustained-release tablets, and capsules *Monitor serum concentration levels.*	Starting dose 10 mg/kg/day; usual maximum: ▪ <1 year of age: 0.2 (age in weeks) + 5 = mg/kg/day ▪ ≥1 year of age: 16 mg/kg/day	Starting dose 10 mg/kg/day; usual maximum: 16 mg/kg/day	Starting dose 10 mg/kg/day up to 300 mg maximum; usual maximum: 800 mg/day

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Inhaled Long-Acting Beta$_2$-Agonists (LABAs) – used in conjunction with ICS† for long-term control; LABA is NOT to be used as monotherapy			
Salmeterol — DPI† 50 mcg/blister	N/A†	1 blister every 12 hours	1 blister every 12 hours
Formoterol —DPI† 12 mcg/single-use capsule	N/A†	1 capsule every 12 hours	1 capsule every 12 hours
Oral Systemic Corticosteroids			
Methylprednisolone — 2, 4, 8, 16, 32 mg tablets **Prednisolone** — 5 mg tablets; 5 mg/5 cc, 15 mg/5 cc **Prednisone** — 1, 2.5, 5, 10, 20, 50 mg tablets; 5 mg/cc, 5 mg/5 cc	▪ 0.25–2 mg/kg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": 1–2 mg/kg/day, max 60 mg/d for 3–10 days	▪ 0.25–2 mg/kg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": 1–2 mg/kg/day, max 60 mg/d for 3–10 days	▪ 7.5–60 mg daily in single dose in a.m. or every other day as needed for control ▪ Short course "burst": to achieve control, 40–60 mg/day as single or 2 divided doses for 3–10 days

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FENO
Fractional Exhaled Nitric Oxide

- Diagnose eosinophilic (T2-high) asthma
- Predict ICS responsiveness
- Monitor inflammation
- Detect poor adherence
- Guide step-up/step-down therapy
- Support biologic selection
- Identify environmental triggers
- 50 ppb (adults) = eosinophilic inflammation
- <25 ppb = unlikely T2 inflammation

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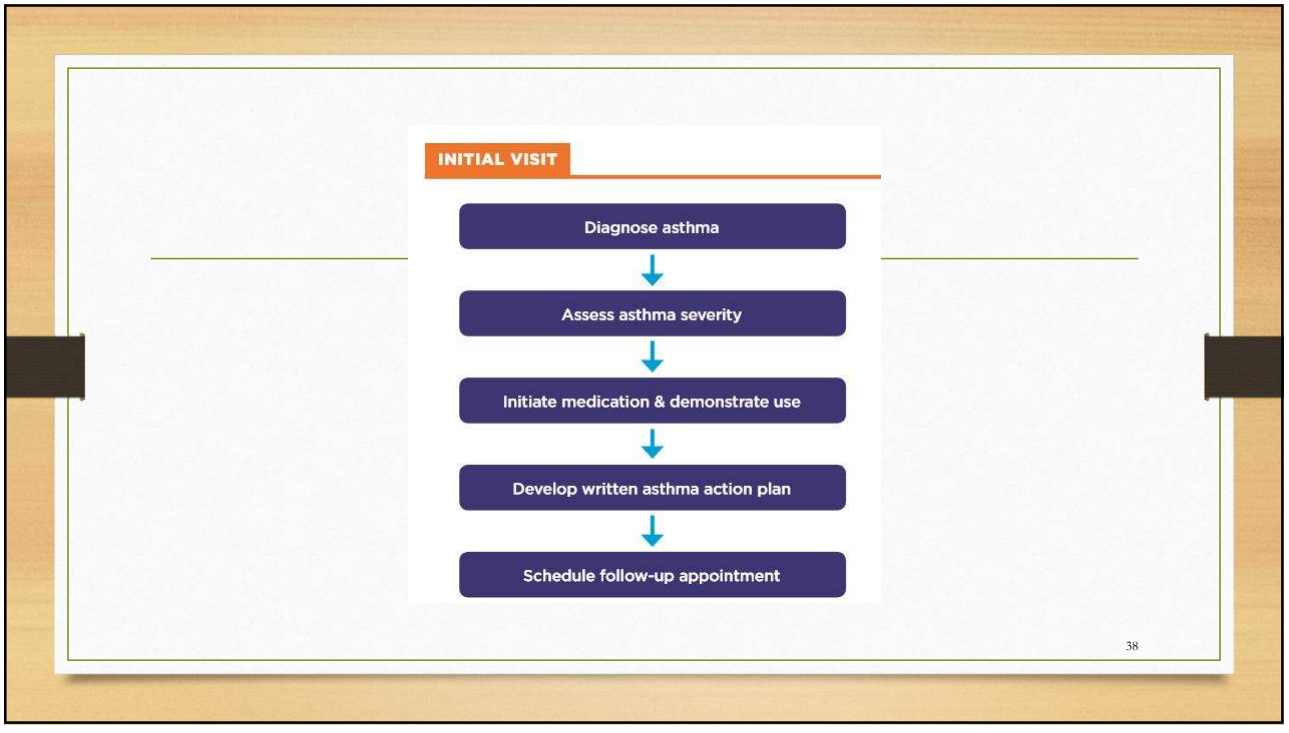

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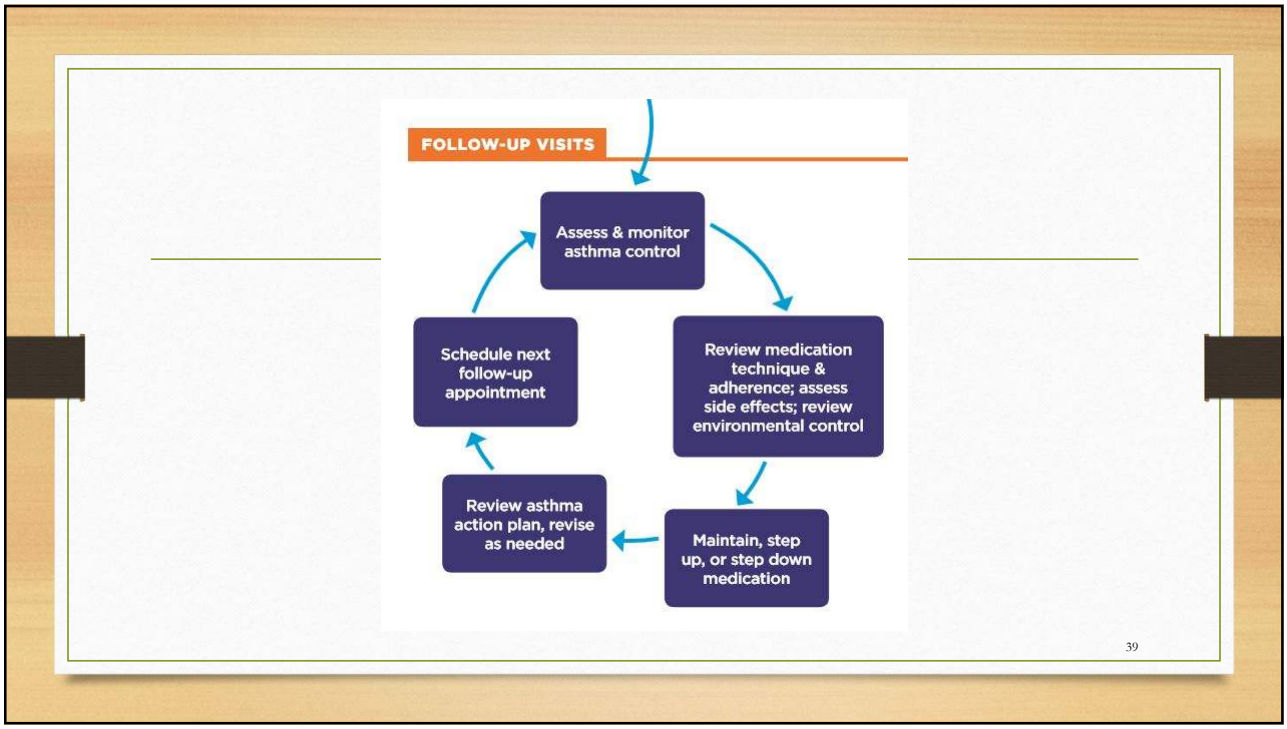
FOLLOW-UP VISITS
Assess & monitor asthma control
Review medication technique & adherence; assess side effects; review environmental control
Maintain, step up, or step down medication
Review asthma action plan, revise as needed
Schedule next follow-up appointment
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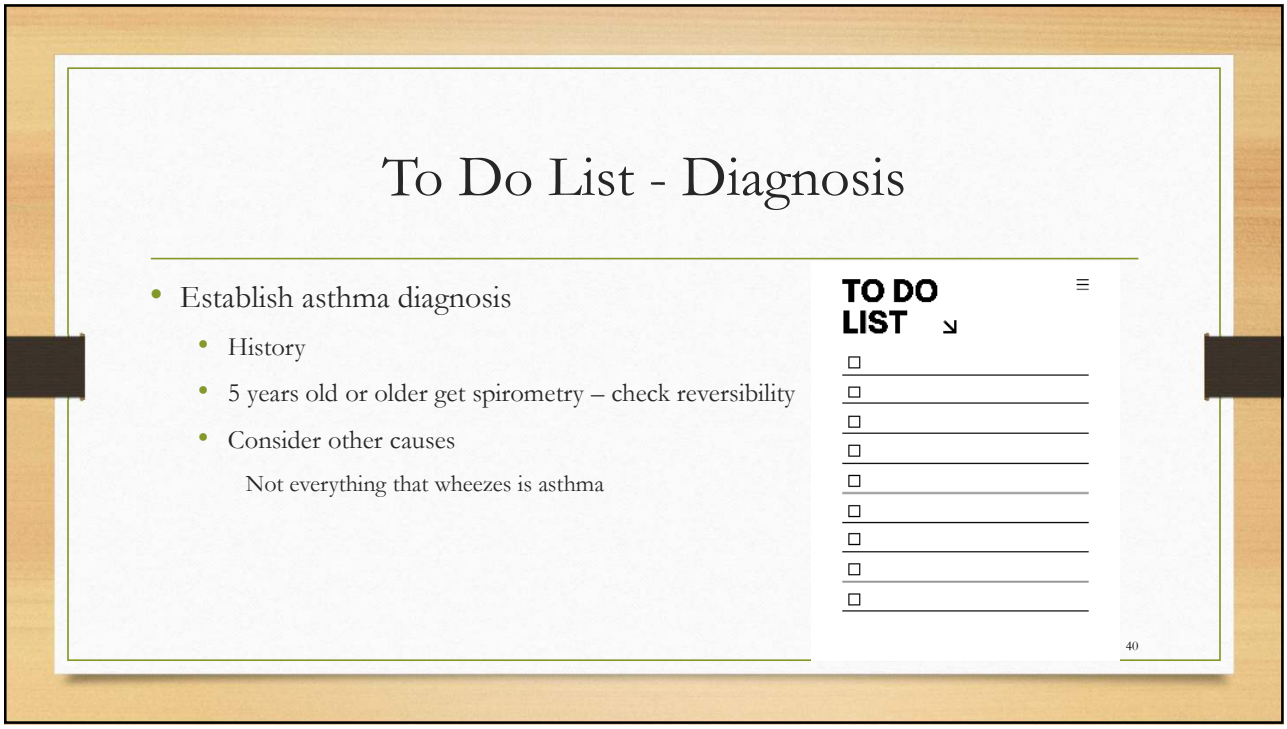
To Do List - Diagnosis
Establish asthma diagnosis
History
5 years old or older get spirometry – check reversibility
Consider other causes
Not everything that wheezes is asthma
TO DO LIST
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To Do List – Control Freak

- Reduce Impairment
  - Prevent chronic symptoms
  - Infrequent use of SABA
  - Maintain near normal lung function and activities

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To Do List – Reduce Risk

- Reduce Risk
  - Prevent Exacerbations
  - Minimize ER visits & hospitalizations.
  - Prevent loss of lung function in adults
  - Prevent reduced lung growth in children.
  - Minimize adverse effects of therapy.

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To Do List – Assess & Monitor

- Initial Visit – Already talked about it
- Follow-up Visit – Assess at each visit
  - Control
  - Proper medication technique
  - Written action plan
  - Adherence
  - Concerns

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To Do List – Assess & Monitor

- Follow-up Visit – Assess at each visit
  - Every 1-2 years check spirometry.
    - More frequently if asthma is not well controlled
  - Should therapy be adjusted?
    - Step up if needed
    - Step down if possible
    - Maintain (3-month rule)

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To Do List – Assess & Monitor

- Schedule Follow-up Visit
  - Every 2-6 weeks while gaining control
  - Every 1-6 months to monitor control
  - Every 3 months if step down is anticipated

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To Do List – Use of Meds

- Select medication and delivery devices that meet patient's needs and circumstances.
- Review medications, technique, and adherence at each follow-up visit

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To Do List – Patient Education

- Teach patients how to manage their asthma
- Develop a written asthma action plan (see sample)
- Integrate education into all points of care involving interactions with patients

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To Do List – Environmental Control

- Recommend ways to control exposures
  - Allergens
  - Irritants
  - Pollutants
- Treat comorbidities
- Prevent EIB
- Maintain control through pregnancy

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To Do List – Comorbidities

- Allergic rhinitis
- GERD
- Obesity
- OSA
- Anxiety/Depression
- Chronic rhinosinusitis
- Smoking
- Viral or bacterial infections

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To Do List – Home Care

- Home Care
  - Early signs & symptoms
  - Measure PEF
  - Adjust meds
  - Monitor response
  - Know when to seek help

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To Do List – Emergency Care

- Assess severity
  - Lung function
  - Physical Exam
  - Signs & symptoms
- Treat
  - Hypoxemia & Airflow obstruction
  - Reduce airway inflammation

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To Do List – Discharge

- Discharge with meds and patient education
  - SABA, oral systemic corticosteroids, consider ICS
  - Refer to follow-up care
  - Asthma discharge plan
  - Review inhaler technique and environmental control

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GINA
Global Initiative for Asthma

- Key concepts
  - Diagnosis
  - Symptom control
  - Future risk

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GINA
Major Changes 2024

- Saba only - not recommended
- Treatment
  - Track 1 (SMART/MART)
  - Track 2 (SABA + ICS)

SMART = Single Maintenance and Reliever Therapy

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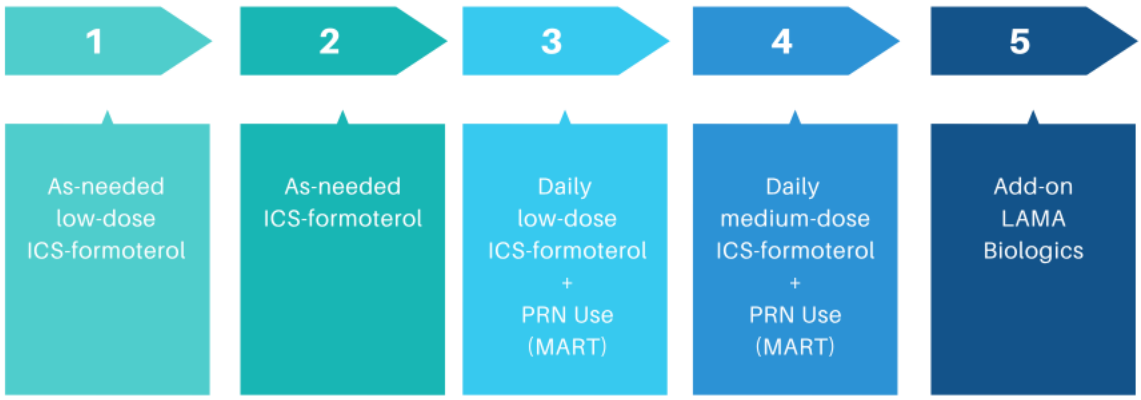
GINA Stepwise Approach ≥ 12 Y/O
Track 1



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(MART = Maintenance and Reliever Therapy)

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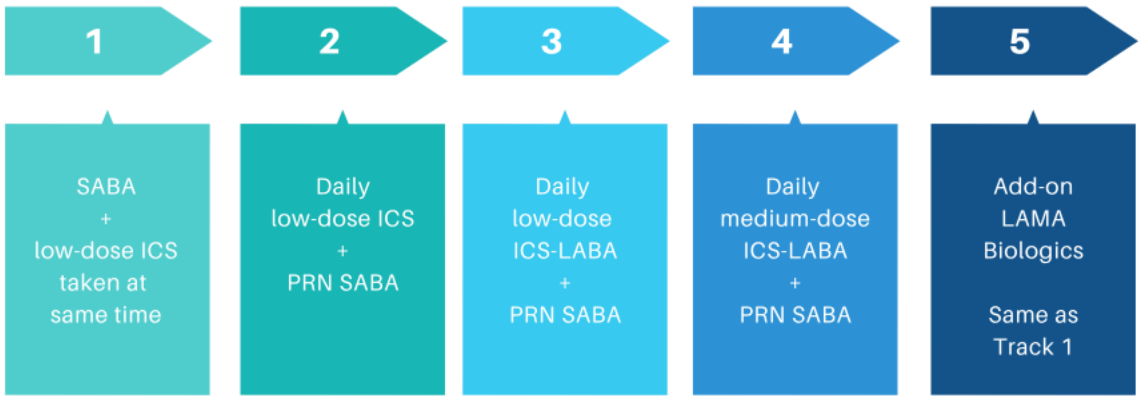
GINA Stepwise Approach ≥ 12 Y/O
Track 2



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GINA for Children

1) 6-11 y/o

Stepwise approach similar to adults

– except ICS-formoterol still under investigation

SABA + ICS

2) 0-5 y/o

Diagnosis relies on symptoms & response

low-dose ICS + PRN SABA

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Assessing Control

1) Check

Daytime symptoms, nighttime awakenings, reliever use, limitations

2) Review

Inhaler technique, adherence, comorbidities

3) Assess risk factors for exacerbations

High SBA use, low FEV_1, eosinophilia, smoking

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Risk Reduction & Education

1) Avoid high SABA use
2) Treat comorbidities
3) Written action plan
4) Education
5) Annual flu vaccination

GINA 2024 — Overuse defined as > 3 SABA canisters/year → ↑ mortality risk.

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Severe & Difficult to Treat

1) Confirm technique
2) Refer to specialist
3) Add biologics
   - **Anti-IgE:** Omalizumab
   - **Anti-IL-5:** Mepolizumab, Reslizumab, Benralizumab
   - **Anti-IL-4R/IL-13:** Dupilumab
   - **Anti-TSLP:** Tezepelumab

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Biologics

Drug Name	Target/Mechanism	Indicated For	Age Approved
Omalizumab (Xolair)	Anti-IgE	Severe allergic asthma	≥6 years
Mepolizumab (Nucala)	Anti–IL-5	Severe eosinophilic asthma	≥6 years
Reslizumab (Cinqair)	Anti–IL-5	Severe eosinophilic asthma	≥18 years
Benralizumab (Fasenra)	IL-5 receptor antagonist (induces eosinophil depletion)	Severe eosinophilic asthma	≥12 years
Dupilumab (Dupixent)	Blocks IL-4/IL-13 signaling	Moderate–severe eosinophilic or steroid-dependent asthma	≥6 years
Tezepelumab (Tezspire)	Anti–TSLP (epithelial cytokine)	Severe asthma of any phenotype (allergic or non-allergic)	≥12 years

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Key GINA Takeaways

1) Always pair reliever with ICS
2) Use ICS-formoterol (Track 1) when available
3) Focus on control, risk, & education – not just symptoms
4) Reinforce inhaler technique & follow-up
5) Use GINA as a global standard – current and evidence-based.

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Certified Asthma Educator

AE-C

- National Asthma Education Certification Board
- Cost $350
- **Eligibility -** There are two kinds of eligibility. A candidate must fulfill ONE of the requirements.
  - 1. Licensed or credentialed health care professionals OR
  - 2. Individuals providing professional direct patient asthma education and counseling with a minimum of 1,000 hours experience in these activities.
- https://www.nbrc.org

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Summary & Review

- NIH/NAEPP
- GINA
- Definition
- Prevalence
- Causes

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Summary & Review

- Diagnose & Symptoms of Asthma
- Classification of Impairment
  - Symptoms
  - Nighttime awakenings
  - SABA Use
  - Activities
  - Lung Function

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Summary & Review

- Risk
- Control
  - Included asthma questionnaire
- To do list
  - Initial visit
  - Follow-up visit

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Summary & Review

- GINA
  - Track 1
  - Track 2
- SMART

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Summary & Review

Certified Asthma Educator Exam

AE-C

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The End

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