



Children's Hospital Association of Texas
Safety and Quality Collaborative
Asthma Management Pathway (ED and IP)

Controller Medications

For children with moderate to persistent asthma continue on prescribed controller medications. For those not on long-term control therapy, consider initiation of an inhaled corticosteroid.

Table 2. Long-term controller medication class, trade names, manufacturers, formulations, and indications^{1, 5-10}

Medication class	Generic name	Trade name	Manufacturer	Dosage form/device	Strength	Approved indication in US and Canada
Inhaled corticosteroids	Beclomethasone dipropionate	QVAR [®]	Ivax	HFA	40 mcg/puff 50 mcg/puff ³ 80 mcg/puff 100 mcg/puff ^a	Asthma (age ≥ 5)
		Vanceril ^{®b}	Schering	MDI	42 mcg/puff 84 mcg/puff	Asthma (age ≥ 5)
	Budesonide	Pulmicort Flexhaler ^{®c}	AstraZeneca	DPI	90 mcg/dose 180 mcg/dose	Asthma (age ≥ 6)
			AstraZeneca	DPI	100 mcg/dose 200 mcg/dose 400 mcg/dose	
		Pulmicort Respules ^{®c}	AstraZeneca	Inhalation suspension	0.25 mg/2ml 0.5 mg/2ml 1 mg/2ml	Asthma (age 1-8)
			AstraZeneca (Canada)	Inhalation suspension	0.125 mg/ml 0.25 mg/ml 0.5 mg/ml	Asthma (age ≥ 3 months)
	Ciclesonide	Alvesco ^{®d}	Sunovion (US) Nycomed Canada Inc (Canada)	HFA-MDI	80 mcg/puff 160 mcg/puff 100 mcg/dose ^a 200 mcg/dose ^a	Asthma (age ≥ 12)
			Forest	MDI MDI-menthol	250 mcg/puff	Asthma (age ≥ 6)
	Flunisolide	AeroSpan ^{®e}	Acton	HFA	80 mcg/puff	Asthma (age ≥ 4)
			Boehringer Ingelheim (Canada)	MDI	250 mcg/puff	Asthma (age ≥ 4)
	Fluticasone propionate	Flovent [®] HFA	GlaxoSmithKline	HFA	44 mcg/puff 50 mcg/puff ³ 110 mcg/puff ³ 125 mcg/puff ^a 220 mcg/puff ^a 250 mcg/puff ^a	Asthma (age ≥ 4)
			GlaxoSmithKline	DPI	50 mcg/dose 100 mcg/dose 250 mcg/dose	Asthma (age ≥ 12)
Flovent Diskus [®]		GlaxoSmithKline	DPI	50 mcg/dose	Asthma (age ≥ 4 yrs)	



Children's Hospital Association of Texas
Safety and Quality Collaborative
Asthma Management Pathway (ED and IP)

Controller Medications

Table 2. Long-term controller medication class, trade names, manufacturers, formulations, and indications^{1, 5-10}

Medication class	Generic name	Trade name	Manufacturer	Dosage form/device	Strength	Approved indication in US and Canada
					100 mcg/dose 250 mcg/dose 500 mcg/dose ^a	
	Mometasone furoate	Asmanex Twisthaler ^{®c}	Schering	DPI	110 mcg/dose 220 mcg/dose	Asthma (age ≥ 4)
	Triamcinolone acetonide	Azmacort ^{®b}	Abbot	MPI – with spacer mouthpiece	75 mcg/dose	Asthma (age ≥ 6)
Leukotriene modifiers	Montelukast	Singulair [®]	Merck	Tablets Chewable tablets Granules	10 mg 4 mg, 5 mg 4 mg/packet	Asthma (age ≥ 1)
Leukotriene receptor antagonists	Zafirlukast	Accolate [®]	AstraZeneca	Tablets	10 mg ^c 20 mg	Asthma (age ≥ 5 yrs in US); (age ≥ 12 yrs in Canada)
5-lipoxygenase Inhibitor	Zileuton	Zyflo ^{®c} Zyflo CR ^{®c}	Critical Therapeutics	Tablets Extended release tablets	600 mg 600 mg	Asthma (age ≥ 12 yrs)
	Arformoterol	Brovana ^{®c}	Sunovion	Inhalation solution	15 mcg/2ml	Not approved for asthma (COPD only)
		Foradil Aerolizer ^{®c}	Schering	DPI	12 mcg/capsule	Asthma (age ≥ 5 yrs)
		Foradil ^{®a}	Novartis Pharmaceuticals Canada Inc.	DPI	12 mcg/capsule	Asthma (age ≥ 6 yrs)
		Oxeze Turbohaler ^{®a}	AstraZeneca (Canada)	DPI	6 mcg/capsule 12 mcg/capsule	Asthma (age ≥ 6 yrs)
		Oxis Turbohaler ^{®f}	Astra Pharmaceuticals	DPI	6 mcg/puff 12 mcg/puff	Asthma (age ≥ 6 yrs)
		Serevent Diskus [®]	GlaxoSmithKline	DPI	50 mcg/blister	Asthma (age ≥ 4 yrs)
	Salmeterol xinafoate	Serevent Diskhaler ^{®a}	GlaxoSmithKline	DPI	50 mcg/blister	Asthma (age ≥ 4 yrs)
Anti-IgE medications	Omalizumab	Xolair [®]	Genentech (US) Novartis Pharmaceuticals Inc (Canada)	Powder for subcutaneous injection	202.5 mg (delivers 150 mg/1.2ml)	Asthma (age ≥ 12 yrs)



Children's Hospital Association of Texas
Safety and Quality Collaborative
Asthma Management Pathway (ED and IP)

Controller Medications

Table 2. Long-term controller medication class, trade names, manufacturers, formulations, and indications^{1, 5-10}

Medication class	Generic name	Trade name	Manufacturer	Dosage form/device	Strength	Approved indication in US and Canada
Combination products ⁷	Fluticasone propionate/ Salmeterol xinafoate	Advair Diskus [®]	GlaxoSmith Kline	DPI	100mcg/50mcg 250mcg/50mcg 500mcg/50mcg	Asthma (age ≥ 4 yrs)
		Advair HFA ^{®c}	GlaxoSmith Kline	HFA	45mcg/21mcg 115mcg/21mcg 230mcg/21mcg	Asthma (age ≥ 12 yrs)
		Advair ^{®a}	GlaxoSmith Kline	HFA	50 mcg/25 mcg 125mcg/25mcg 250mcg/25mcg	Asthma (age ≥ 12 yrs)
	Budesonide/ Formoterol	Symbicort ^{®c}	AstraZeneca	HFA	80mcg/4.5mcg 160mcg/4.5mcg	Asthma (age ≥ 12 yrs)
		Symbicort Turbuhaler ^{®a}	AstraZeneca (Canada)	DPI	100mcg/6mcg 200mcg/6mcg	Asthma (age ≥ 12 yrs)
		Symbicort Forte Turbuhaler ^{®a}	AstraZeneca (Canada)	DPI	400mcg/12/cg	Asthma (age ≥ 12 yrs)

Abbreviations: DPI = dry powder inhaler; HFA = hydrofluoroalkane propellant; MDI = metered dose inhaler.
 Note: Unless otherwise noted, the products are available in both the US and Canada

^a This product is available in Canada only.

^b This product has been discontinued by the manufacturer.

^c This product is available in the US only.

^d The FDA approved dosing regimen for ciclesonide is twice daily.

^e This product is not yet available.

^f This product is not available in the US or Canada.

^g Dulera[®] (Zenhalo[®] in Canada) (mometasone furoate/formoterol fumarate), now approved for treatment of asthma in people >12 years, is not included in this report because it was approved after our cutoff date for the inclusion of new medication.



Children's Hospital Association of Texas
Safety and Quality Collaborative
Asthma Management Pathway (ED and IP)

Controller Medications

Table 3. Estimated comparative daily dosages for inhaled corticosteroids^{1, 11}

Drug	Low daily dose			Medium daily dose			High Daily Dose		
	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & adults	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & adults	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & Adults
Beclomethasone CFC		84-336 mcg	168-504 mcg		336-672 mcg	504-840 mcg		> 672 mcg	> 840 mcg/d
42 mcg/puff		2-8 puffs/d	4-12 puffs/d		8-16 puffs/d	13-20 puffs/d		> 16 puffs/d	> 20 puffs/d
84 mcg/puff		1-4 puffs/d	2-6 puffs/d		4-8 puffs/d	7-10 puffs/d		> 8 puffs/d	> 10 puffs/d
Beclomethasone HFA		80-160mcg	80-240mcg		> 160-320 mcg	> 240-480 mcg		> 320 mcg	> 480 mcg
40 mcg/puff		2-4 puffs/d	2-6 puffs/d		4-8 puffs/d	6-12 puffs/d		> 8 puffs/d	> 12 puffs/d
80 mcg/puff		1-2 puffs/d	1-3 puffs/d		2-4 puffs/d	3-6 puffs/d		> 4 puffs/d	> 6 puffs/d
Budesonide CFC†		400-800 mcg	400-1200 mcg		800-1600 mcg	1200-2400 mcg		> 1600 mcg	> 2400mcg
200 mcg/dose		2-4 puffs/d	2-6 puffs/d		4-8 puffs/d	6-12 puffs/d		> 8 puffs/d	> 12 puffs/d
Budesonide DPI (Flexhaler)		180-400 mcg	180-600 mcg		> 400-800 mcg	> 600-1200 mcg		> 800 mcg	> 1200 mcg
90 mcg/dose		2-4 puffs/d	2-6 puffs/d		4-8 puffs/d	6-13 puffs/d		> 8 puffs/d	> 13 puffs/d
180 mcg/dose		1-2 puffs/d	1-3 puffs/d		2-4 puffs/d	3-6 puffs/d		> 4 puffs/d	> 6 puffs/d
Budesonide DPI (Turbuhaler)		180-400 mcg	180-600 mcg		> 400-800 mcg	> 600-1200 mcg		> 800 mcg	> 1200 mcg
200 mcg/dose		1-2 puffs/d	1-3 puffs/d		2-4 puffs/d	3-6 puffs/d		> 4 puffs/d	> 6 puffs/d
Budesonide suspension (Respules)	0.25-0.5mg	0.5mg		> 0.5-1mg	1mg		> 1mg	2mg	
0.25 mg/2ml inhalation	2-4 ml/d	4 ml/d		4-8 ml/d	8 ml/d		> 8 ml/d	16 ml/d	
0.5mg/2ml inhalation	1-2ml/d	2ml/d		2-4ml/d	4ml/d		> 4ml/d		
1 mg/2ml inhalation	0.5-1ml/d	1ml/d		1-2ml/d	2 ml/d		> 2 ml/d	4 ml/d	
Ciclesonide[§]			80-160 mcg			>160-320 mcg			>320 mcg/d
80mcg/puff			2 puffs/d			2-4 puffs/d			4-16 puffs/d
160mcg/puff			NA			2 puffs/d			2-8 puffs/d
Flunisolide		500-750 mcg	500-1000 mcg		1000-1250 mcg	>1000-2000 mcg		> 1250 mcg	> 2000 mcg
250 mcg/puff		2-3 puffs/d	2-4 puffs/d		4-5 puffs/d	4-8 puffs/d		> 5 puffs/d	> 8 puffs/d
Flunisolide HFA		160 mcg	320 mcg		320mcg	> 320-640 mcg		≥ 640 mcg	> 640 mcg
80 mcg/puff		2 puffs/d	4 puffs/d		4 puffs/d	4-8 puffs/d		> 8 puffs/d	> 8 puffs/d



**Children's Hospital Association of Texas
Safety and Quality Collaborative
Asthma Management Pathway (ED and IP)**

Controller Medications

Table 3. Estimated comparative daily dosages for inhaled corticosteroids^{1, 11}

Drug	Low daily dose			Medium daily dose			High Daily Dose		
	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & adults	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & adults	Child 0-4 yrs	Child 5-11 yrs	≥12yrs & Adults
Fluticasone MDI	176 mcg	88-176 mcg	88-264 mcg	> 176-352 mcg	> 176-352 mcg	> 264-440 mcg	> 352 mcg	> 352 mcg	> 440 mcg
44 mcg/puff	4 puffs/d	2-4 puffs/d	2-6 puffs/d	6-15 puffs/d	4-10 puffs/d	6-10 puffs/d	> 8 puffs/d	> 8 puffs/d	> 10 puffs/d
110 mcg/puff	1 puff/d	1 puff/d	1-2 puffs/d	2-6 puffs/d	1-4 puffs/d	2-4 puffs/d	> 4 puffs/d	> 4 puffs/d	> 4 puffs/d
220 mcg/puff	NA	NA	1 puff/d	1-3 puffs/d	1-2 puffs/d	1-2 puffs/d	> 1 puffs/d	> 1 puffs/d	> 2 puffs/d
Fluticasone DPI (Rotadisk; Diskus)		100-200 mcg	100-300 mcg		> 200-400 mcg	> 300-500 mcg		> 400 mcg	> 500 mcg
50 mcg/dose DPI		2-4 puffs/d	2-6 puffs/d		4-8 puffs/d	6-10 puffs/d		> 8 puffs/d	> 10 puffs/d
100 mcg/dose DPI		1-2 puffs/d	1-3 puffs/d		2-4 puffs/d	3-5 puffs/d		> 4 puffs/d	> 5 puffs/d
250 mcg/dose DPI		NA	1 puff/d		1 puff/d	1-2 puffs/d		> 1 puff/d	> 2 puffs/d
Mometasone DPI (Asmanex Twisthaler)		100 mcg	200 mcg			400 mcg			> 400 mcg
110 mcg/dose (delivers 100mcg/dose)		1 puff/d	2 puffs/d			4 puff/d			> 4 puffs/d
220 mcg/dose (delivers 200mcg/dose)		NA	1 puff/d			2 puffs/d			> 2 puffs/d
Triamcinolone MDI		300-600 mcg	300-750 mcg		> 600-900 mcg	> 750-1500 mcg		> 900 mcg	> 1500 mcg
75 mcg/puff		4-8 puffs/d	4-10 puffs/d		8-12 puffs/d	10-20 puffs/d		> 12 puffs/d	> 20 puffs/d

Abbreviations: HFA = Hydrofluoroalkane propellant; MDI = Metered dose inhaler; DPI = Dry powder inhaler; estimated dosing equivalency from Thorsson et al.¹² and Agertoft & Pedersen;¹³ CFC = Contains chlorofluorocarbons; substances known to destroy ozone in the upper atmosphere.

^a FDA approved labeling for ciclesonide: Initial treatment for patients on prior therapy with bronchodilators alone: 80 mcg twice daily (for a total of 160mcg/day, considered low dose; maximum dose 320 mcg/day). Initial treatment for patients with prior therapy with inhaled corticosteroids: 80 mcg twice daily (maximum dose: 640 mcg/day). For patients with prior therapy with oral corticosteroids: 320 mcg twice daily (maximum dose: 640 mcg/day). Canadian labeling: Initial: 400 mcg once daily; maintenance: 100-800 mcg/day (1-2 puffs once or twice daily)

Reference:

Jonas D.E., Wines R.C.M., DelMonte M., et al. (April 2011). Drug Class Review: Controller Medications for Asthma: Final Update 1 Report [Internet]. Portland (OR): Oregon Health & Science University.
<http://www.ncbi.nlm.nih.gov/books/NBK56695/>.
<http://www.ncbi.nlm.nih.gov/books/NBK56695/pdf/TOC.pdf>