Acute Severe Asthma

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Table 3: Assessing Asthma Severity Becker Asthma Score

Score	Respiratory Rate (per min)	Wheezing	I/E Ratio	Accessory Muscle Use
0	<30	None	1:1.5	None
1	30-40	Terminal expiration	1:2	1 site
2	41-50	Entire expiration	1:3	2 sites
3	>50	Inspiration and entire expiration	>1:3	3 sites or neck strap muscle use

Score ≤ 4 = mild
Score > 4 to < 7 = moderate
Score ≥ 7 = severe (needs PICU)

Source: Ducharme FM, Chalut D, Ploynick L, et al. The Pediatric Respiratory Assessment Measure: A valid clinical score for assessing acute asthma severity from toddlers to teenagers. J Pediatr 2008;152:476-480

Table 4 Asthma Severity

Parameter*	Mild	Moderate	Severe	Imminent Respiratory Arrest
Breathlessness	Walking Can lie down	Talking (infant: shorter cry/difficult feeding); Prefers sitting	At rest (infant will stop feeding) Hunched over	
Talks in	Sentences	Phrases	Words	
Alertness	May be agitated	Usually agitated	Usually agitated	Drowsy/confused
Respiratory rate	Increased	Increased	Increased	Bradypnea
Accessory muscles and suprasternal retractions	Usually not	Usually	Usually	Paradoxical movement
Wheeze	Moderate (end expiration)	Loud	Usually Loud	Absence of wheeze
Pulse/min	<100	100-2120	>120	Bradycardia
Pulsus paradoxus (mm HG)	Absent (<10)	10-25	>25	Absence suggests respiratory muscle fatigue
PEFR (after bronchodilator)	>80%	60-80%	<60%	
PaO2 on room air and/or PaCO2 (mm Hg)	Normal (need not be tested)	<45	>45	
Saturation	?95%	91-95%	90% or less	

*The presence of several parameters, but not necessarily all, indicates the severity of the attack
PEFR = peak expiratory flow rate

Source: Becker AB, Nelson NA, Simons FE. The pulmonary index. Assessment of a clinical score for asthma. Am J Dis Child 1984;138:574-576.

Table 7 Common Drugs and Doses in Acute Severe Asthma

Corticosteroids

- Usually administered intravenously
- Methylprednisolone: 2-4 mg/kg/day, with a maximum dose of 60 mg/day (adult maximum 125 mg/day)

Beta-agonist (Albuterol)

- Hourly or continuously delivered albuterol via nebulizer
- Hourly: 0.15 mg/kg every hour (minimum 2.5 mg; maximum 5 mg)
- Continuous: 0.3-0.5 mg/kg/hour up to 20 mg/hr (consider 10 mg/hr for children who weigh 5-10 kg; 15 mg/hr for children who weigh 10-20 kg; and 20 mg/hr for children who weigh >20 kg)

Beta-agonist (Terbutaline)

- Continuous intravenous infusion
- Loading dose: 2-10 mcg/kg
- Infusion dose: 0.5 mcg/kg/min; dose may be increased by 0.1-0.2 mcg/kg/min every 15-30 min; doses up to 10 mcg/kg/min have been reported

Ipratropium bromide

- 250 mcg/dose for children <20 kg; 500 mcg/dose for children $\geq$ 20 kg
- Consider 3 doses given every 4-8 hours

Magnesium sulfate

- 50-75 mg/kg (max dose 2 grams given every 4-6 hours)
- Optimal magnesium level 4-5.5 mg/dL

Aminophylline

- Aminophylline is the ethylenediamine salt of theophylline: pharmacokinetic parameters are those of theophylline; 100 mg aminophylline = 80 mg theophylline
- Monitoring parameter: Theophylline level; recommend level < 15 mcg/mL
- Loading dose (inpatients not currently receiving aminophylline or theophylline): 5-6 mg/kg (based on aminophylline) over 20-30 minutes
- Continuous infusion follows, and dose depends on patient age and desired level
- Suggested infusion rates:
  - 6 months – 1 year: 0.7 mg/kg/hr aminophylline
  - 1-9 years: 1.2 mg/kg/hr aminophylline
  - 10-16 years: 0.9 mg/kg/hr aminophylline
- Metabolism is influenced by multiple medications
- Effect as a respiratory muscle inotrope is dose-dependent; lower doses are effective

Leukotriene Modifiers

- Montelukast (Singulair) oral tablets
- Dose:
  - 1-5 years: 4 mg po QD
  - 6-14 years: 5 mg po QD