

ALGORITHM A: EMERGENCY MANAGEMENT OF ADULT ASTHMA

Emergency Department Assessment and Treatment of Adults

	ASSESSMENT	PRE-TREATMENT	TREATMENT	NOT IMPROVED
MILD	<ul style="list-style-type: none"> Exertional dyspnea/cough; can lie down ± nocturnal symptoms increased use of β-agonist good response to β-agonist talks in sentences 	<ul style="list-style-type: none"> PEFR/FEV1 >80% predicted or personal best (PEFR >300 L/min FEV1 >2.1 L) SaO2% >95% room air Pulse <100 Resp.Rate ↑ Breath sounds: Moderate wheeze-end expiratory 	<ul style="list-style-type: none"> O2 to achieve SaO2 ≥ 95% β-agonist (nebulizer, up to 3 doses in first hour) Oral systemic corticosteroids 	
MODERATE	<ul style="list-style-type: none"> Dyspnea while talking (phrases); prefers sitting Cough Nocturnal symptoms Partial relief from β-agonist needed >8 puffs /day or Q2 HHN Chest tightness 	<ul style="list-style-type: none"> PEFR/FEV1 50-80% predicted or personal best (PEFR 200 – 300 L/min FEV1 1.6-2.1 L) SaO2% 91-95% room air Pulse 100-120 Resp.Rate ↑ Breath sounds: wheeze; throughout inhalation and exhalation 	<ul style="list-style-type: none"> O2 to achieve SaO2 ≥ 95% β-agonist and anticholinergic (nebulizer, up to 3 doses in first hour or continuous treatment for 1 hour) Systemic corticosteroids 	Reassess to evaluate response to treatment – Admission recommended with no improvement
SEVERE	<ul style="list-style-type: none"> Labored respirations; sits upright Agitated, diaphoretic Difficulty speaking no relief with β-agonists 	<ul style="list-style-type: none"> SaO2% <91% PEFR/FEV1 unable or <40% predicted or personal best (PEFR <200 L/min FEV1 <1.6 L) Pulse >120 Resp.Rate >30/min Breath sounds: decreased; wheezing throughout inhalation and exhalation 	<ul style="list-style-type: none"> 100% O2 continuous β-agonist and anticholinergics systemic corticosteroids systemic magnesium sulfate cardiac monitoring oximetry, ABG's CXR frequent reassessment spirometry when possible medical supervision until clear signs of improvement 	ICU admission/Tertiary Care
NEAR DEATH	<ul style="list-style-type: none"> exhausted, confused diaphoretic, cyanotic 	<ul style="list-style-type: none"> SaO2 <90% (despite supplemental O2) Silent chest Bradycardia; ↓ resp. effort PEFR/FEV1 not appropriate 	<p>IF NEAR DEATH OR DETERIORATING</p> <p>↓</p> <p>RAPID SEQUENCE INTUBATION</p>	Consider alternative drugs; IV β-agonists, inhalational anesthetic agents, aminophylline, epinephrine, etc.

ALGORITHM B: EMERGENCY MANAGEMENT OF PEDIATRIC ASTHMA

Emergency Department Assessment and Treatment for Pediatrics

	ASSESSMENT	PRE-TREATMENT	TREATMENT	NOT IMPROVED										
MILD	<ul style="list-style-type: none"> Nocturnal cough Exertional dyspnea; plays quietly Increased use of β-agonist Good response to β-agonist May be agitated Can lie down 	<ul style="list-style-type: none"> O₂ Saturation >95% Increased resp. rate Moderate wheeze-end expiratory <p><u>Respiratory Rates</u></p> <table border="0"> <tr> <td><i>Age</i></td> <td><i>Normal rate</i></td> </tr> <tr> <td><2 months</td> <td><60/min</td> </tr> <tr> <td>2-12 months</td> <td><50/min</td> </tr> <tr> <td>1-5 years</td> <td><40/min</td> </tr> <tr> <td>6-8 years</td> <td><30/min</td> </tr> </table>	<i>Age</i>	<i>Normal rate</i>	<2 months	<60/min	2-12 months	<50/min	1-5 years	<40/min	6-8 years	<30/min	<ul style="list-style-type: none"> O₂ to achieve SaO₂ \geq 95% β-agonist (nebulizer, up to 3 doses in first hour) Oral systemic corticosteroids 	
<i>Age</i>	<i>Normal rate</i>													
<2 months	<60/min													
2-12 months	<50/min													
1-5 years	<40/min													
6-8 years	<30/min													
MODERATE	<ul style="list-style-type: none"> Usually agitated partial relief with β-agonist and needed > q4h Prefers sitting Shorter cry Difficulty feeding Some use of accessory muscles; increased work of breathing 	<ul style="list-style-type: none"> SaO₂% 92-95% room air Increased resp rate Increased heart rate Wheezing throughout inhalation and exhalation <p><u>Pulse rates</u></p> <table border="0"> <tr> <td><i>Age</i></td> <td><i>Normal rate</i></td> </tr> <tr> <td>2-12 months</td> <td><160/min</td> </tr> <tr> <td>1-2 years</td> <td><120/min</td> </tr> <tr> <td>2-8 years</td> <td><110/min</td> </tr> </table>	<i>Age</i>	<i>Normal rate</i>	2-12 months	<160/min	1-2 years	<120/min	2-8 years	<110/min	<ul style="list-style-type: none"> O₂ to achieve SaO₂ \geq 95% β-agonist and anticholinergic (nebulizer, up to 3 doses in first hour or continuous treatment for 1 hour) Systemic corticosteroids 	Admission recommended		
<i>Age</i>	<i>Normal rate</i>													
2-12 months	<160/min													
1-2 years	<120/min													
2-8 years	<110/min													
SEVERE	<ul style="list-style-type: none"> Dyspnea at rest; grunting Use of accessory muscles; suprasternal retractions Stops feeding Sits upright Very agitated 	<ul style="list-style-type: none"> SaO₂% <92% Laboured respirations Persistent tachycardia Breath sounds: decreased; wheezing throughout inhalation and exhalation 	<ul style="list-style-type: none"> 100% O₂ continuous β-agonist and anticholinergics systemic corticosteroids systemic magnesium sulfate cardiac monitoring oximetry, ABG's CXR frequent reassessment medical supervision until clear signs of improvement 	ICU admission/Tertiary Care										
NEAR DEATH	<ul style="list-style-type: none"> exhausted, drowsy diaphoretic, cyanotic apnea 	<ul style="list-style-type: none"> SaO₂ % <80% Decreased respiratory effort Falling heart rate Paradoxical thoracoabdominal movement Silent chest 	<p>IF NEAR DEATH OR DETERIORATING</p> <p style="text-align: center;">↓</p> <p>RAPID SEQUENCE INTUBATION</p>	Consider alternative drugs: IV β -agonist, inhalational anesthetic agents, aminophylline, epinephrine, etc.										

Recommended Emergency Department Drug Doses

<p>β-agonists: first line bronchodilators-titrate to response</p> <p>Adults:</p> <ul style="list-style-type: none"> • 2.5-5.0 mg Albuterol solution (5 mg/ml) with 3cc normal saline - q20 min. X3 then 2.5-10 mg q 1-4 hours as needed with 6-8 L/m O2 • 10-15 mg Albuterol solution (5 mg/ml) continuous nebulization with normal saline q hour delivered with O2 <p>Pediatrics:</p> <ul style="list-style-type: none"> • Albuterol solution (5 mg/ml) 0.15mg/kg q20 min X3 then 0.15-0.3 mg/kg up to 10 mg q 1-4 hours as needed • Albuterol (5 mg/ml) 0.5 mg/kg/hour by continuous nebulization with normal saline q hour delivered with O2 max 10mg/hr 	<p>Systemic Corticosteroids: first line preventer therapy-oral preferred if patient can tolerate</p> <p>Adults:</p> <ul style="list-style-type: none"> • Prednisone 40-60 mg (PO) • Hydrocortisone 500 mg (IV) • Methylprednisone 125 mg (IV) <p>Pediatrics:</p> <ul style="list-style-type: none"> • Predisone 1-2 mg/kg (PO) • Hydrocortisone 5-7 mg/kg (IV) • Methylprednisone 2 mg/kg (IV) max 180mg 	<p>Intubation Agents</p> <p>Adults:</p> <ul style="list-style-type: none"> • Induction: Ketamine 1.5 mg/Kg IV • Paralysis: Succinylcholine 1.5 mg/Kg IV • Vecuronium 0.15 mg/Kg for maintenance of paralysis only <p>Pediatrics:</p> <ul style="list-style-type: none"> • Pretreatment: Atropine 0.02 mg/kg IV • Sedation: Midazolam 0.1 mg/kg IV • Induction: Ketamine 1.5mg/kg IV • Paralysis: Succinylcholine 1.5 mg/kg IV • Pancuronium 0.1 mg/kg IV for maintenance of paralysis only
<p>Anticholinergics</p> <p>Adults:</p> <ul style="list-style-type: none"> • Ipratropium bromide nebulizer solution (.25 mg/ml) 0.5 mg q 20 min X3 doses then q2-4 hours as needed <p>Pediatrics:</p> <ul style="list-style-type: none"> • Ipratropium bromide nebulizer solution (.25 mg/ml) 0.25 mg q 20 min X3 then q 2-4 hours for patients <10kg 	<p>Magnesium Sulfate</p> <p>Adults:</p> <ul style="list-style-type: none"> • 2 grams IV over 20 minutes as bolus <p>Pediatrics:</p> <ul style="list-style-type: none"> • 25-50 mg/kg/dose IV over 20 minutes as bolus (maximum of 2 gm/v) 	<p>Additional Drugs</p> <p>Adults:</p> <ul style="list-style-type: none"> • Epinephrine (1 mg/ml) 0.3-0.5 mg q20 min X3 SQ • Terbutaline (1 mg/ml) 0.25 mg q20 min X3 SQ • Aminophylline 0.6 mg/kg/hr continuous infusion (keep level 8-15 µg/ml) <p>Pediatrics:</p> <ul style="list-style-type: none"> • Epinehrine (1 mg/ml) 0.01 mg/kg up to 0.3-0.5 mg q20 min X3 SQ • Terbutaline (1 mg/ml) 0.01 mg/kg q20 min X3 then Q2-6 hours as needed SQ max 0.4mg/dose • Aminophylline 0.5-1 mg/kg/hr continuous infusion(follow levels)

Emergency Department Discharge Treatment Plan

Medications	Patient Instructions
<p>A. β-agonist</p> <ol style="list-style-type: none">1. Regular use 2-4 puffs q3-4 hours required for 48 hours2. PRN use after 48 hours - follow asthma action plan3. If unable to control symptoms with regular dose β-agonists call Nuselink at 358-3000 or return to Emergency Department <p>B. Corticosteroids</p> <ol style="list-style-type: none">1. Adults: Prednisone 50 mg/day for 7 days as a non-tapered dose Pediatrics: Prednisone 1-2 mg/kg/day for 7 days as non-tapered dose2. Daily medication: Mild Intermittent – Initiate low dose corticosteroid if patient requires short-acting β-agonist more than 2 times per week Mild Persistent - Low dose corticosteroids <u>or</u> leukotriene receptor agonist <u>or</u> cromolyn Moderate Persistent - Long acting β-agonist <u>and</u> medium dose corticosteroid; may add leukotriene receptor Severe Persistent – High dose corticosteroids and long acting β-agonist <p>C. Other medications</p> <ol style="list-style-type: none">1. To be continued on discharge2. Role in long term management to be assessed by primary care provider. <p>D. Antibiotics</p> <ol style="list-style-type: none">1. Antibiotics are not first line treatment and should be reserved for patients that fail to respond to aggressive anti-inflammatory therapy.	<p>Patient Instructions</p> <p>Review</p> <ol style="list-style-type: none">1. Asthma Action Plan – signs and symptoms2. Drug delivery technique, role, dosing and schedule3. Role of reliever (β-agonist) and preventers (anti-inflammatory)4. Peak flow technique and zones5. Role of trigger avoidance <p>Explain: When to seek treatment</p> <ol style="list-style-type: none">1. Follow up with primary care provider or Acute Care Clinic in 1-7 days to assess adequacy of treatment response.2. Follow treatment plan and zones: signs and symptoms and medication requirement.3. To seek advice on assessment, call Nurselink 358-3000 or return to emergency department. <p>Educate</p> <ol style="list-style-type: none">1. Provide patient or parent/guardian with written instructions to include Asthma Action Plan at discharge.2. Consider referral to Respiratory Care to provide patient with asthma education classes.