

# Asthma Care in the Emergency Department

**Clinical Practice Guideline (CPG)**

**Protocol approved by: Division of Pediatric Emergency Medicine  
Date of approval: March 5, 2015**

# Asthma Care in the Emergency Department

## Clinical Practice Guideline

**Inclusion:** 1) Children 2 years of age or older with a prior history of wheezing, and 2) Children less than 2 years of age with likely Asthma\* rather than Acute Bronchiolitis

\* **Likely Asthma:** on home controller medications/steroids, followed by Pulmonary or Allergy Service, multiple previous wheezing episodes, history of atopy, and/or strong family history of asthma

**Exclusion:** History of unstable heart disease or suspicion of other reason for wheezing (laryngomalacia, tracheomalacia, foreign body, etc.)

**Time 0:** Obtain vital signs, pulse oximetry and height in children older than 6 years, then determine initial asthma score:

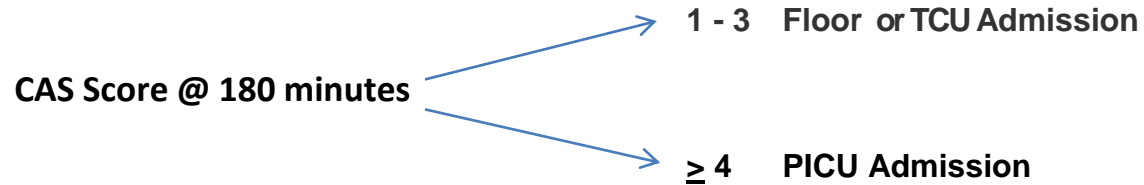
### Clinical Asthma Score (CAS)

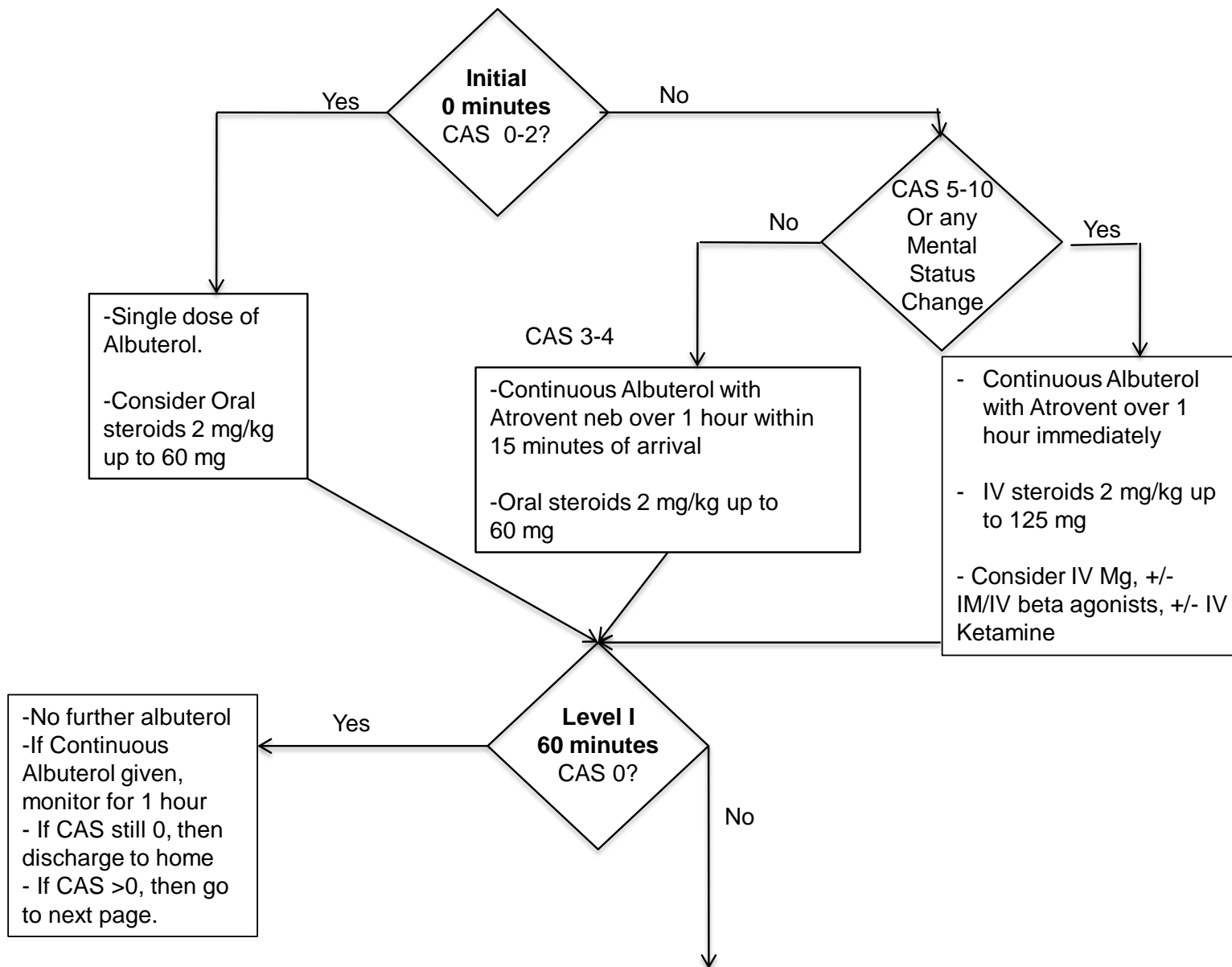
Score points	SpO2	Auscultation	Accessory Muscle Use/Retractions	Inspiratory breath sounds	Dyspnea
0	>95% on room air	None or end expiratory wheezes	None	Normal	Speaks in sentences/ coos and babbles
1	90-95% on room air	Wheezing through entire expiratory phase	Substernal/ subcostal/ intercostal/ nasal flaring	Unequal	Speaks in partial sentences/ short cry
2	<90% on room air/ requiring any oxygen	Inspiratory and expiratory wheezing	Supraclavicular/ See-saw respirations	Decreased	Speaks in single words/short phrase/grunting

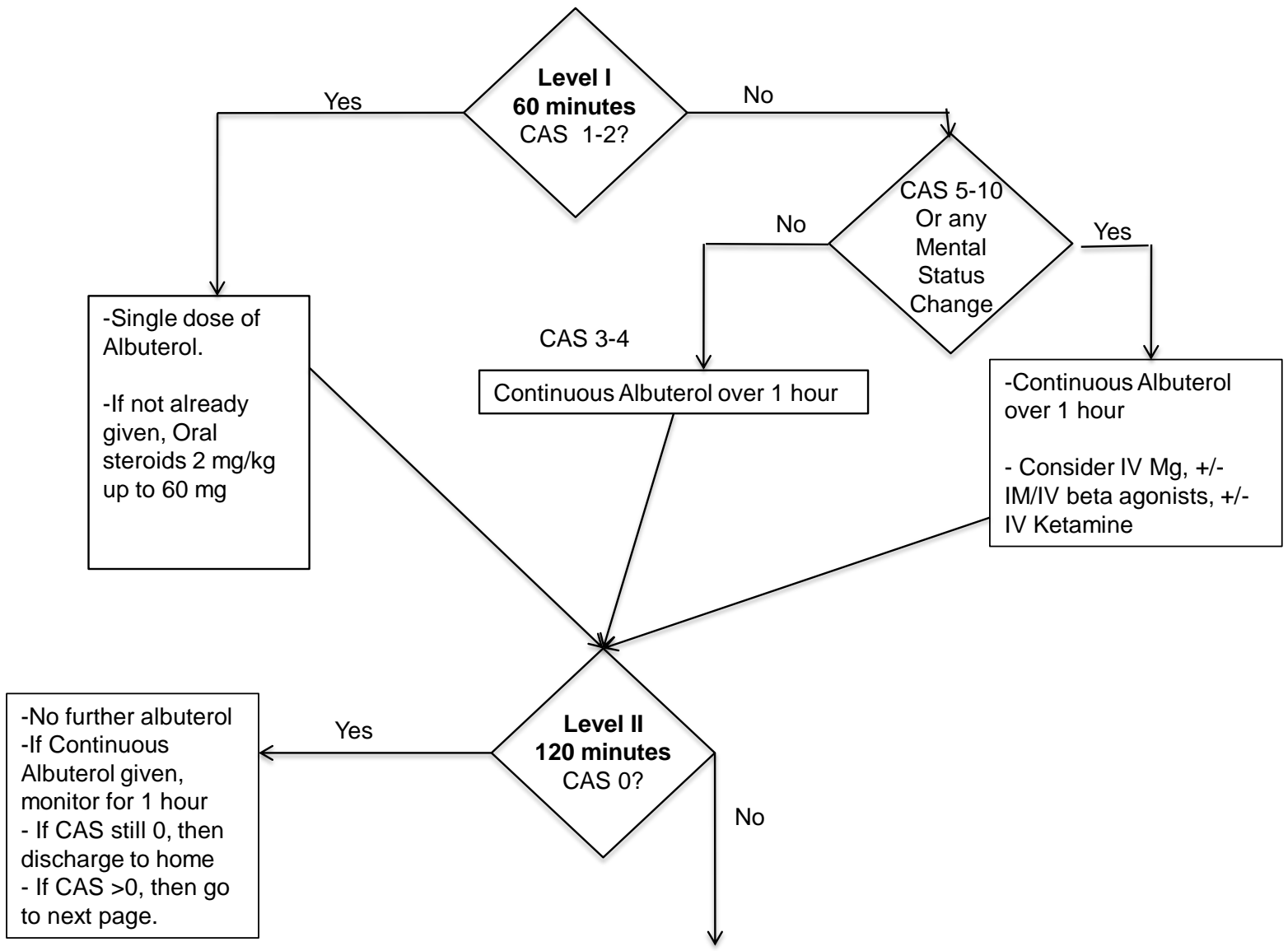
## ED to Inpatient Admission Pathway

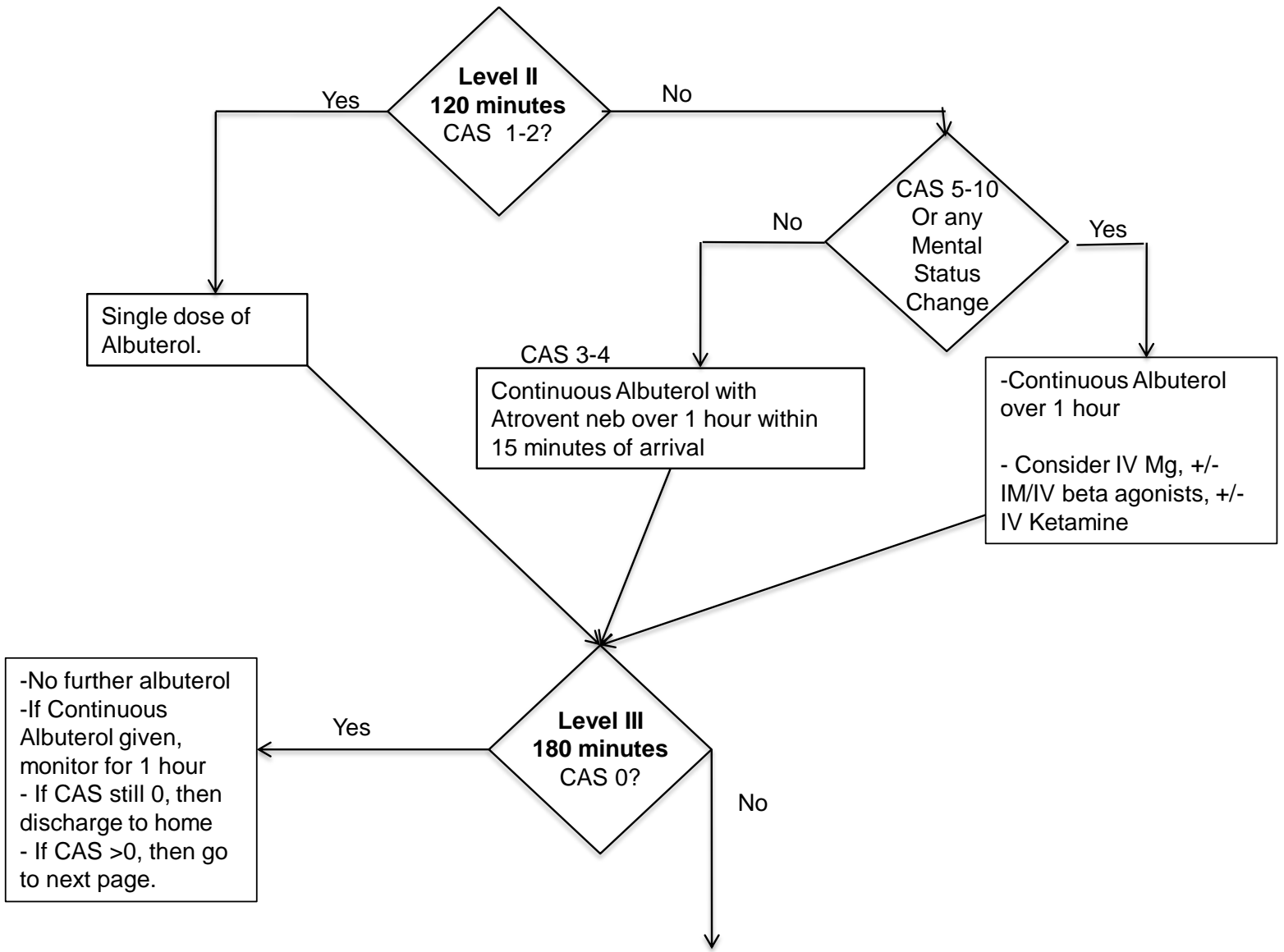
### Key Points:

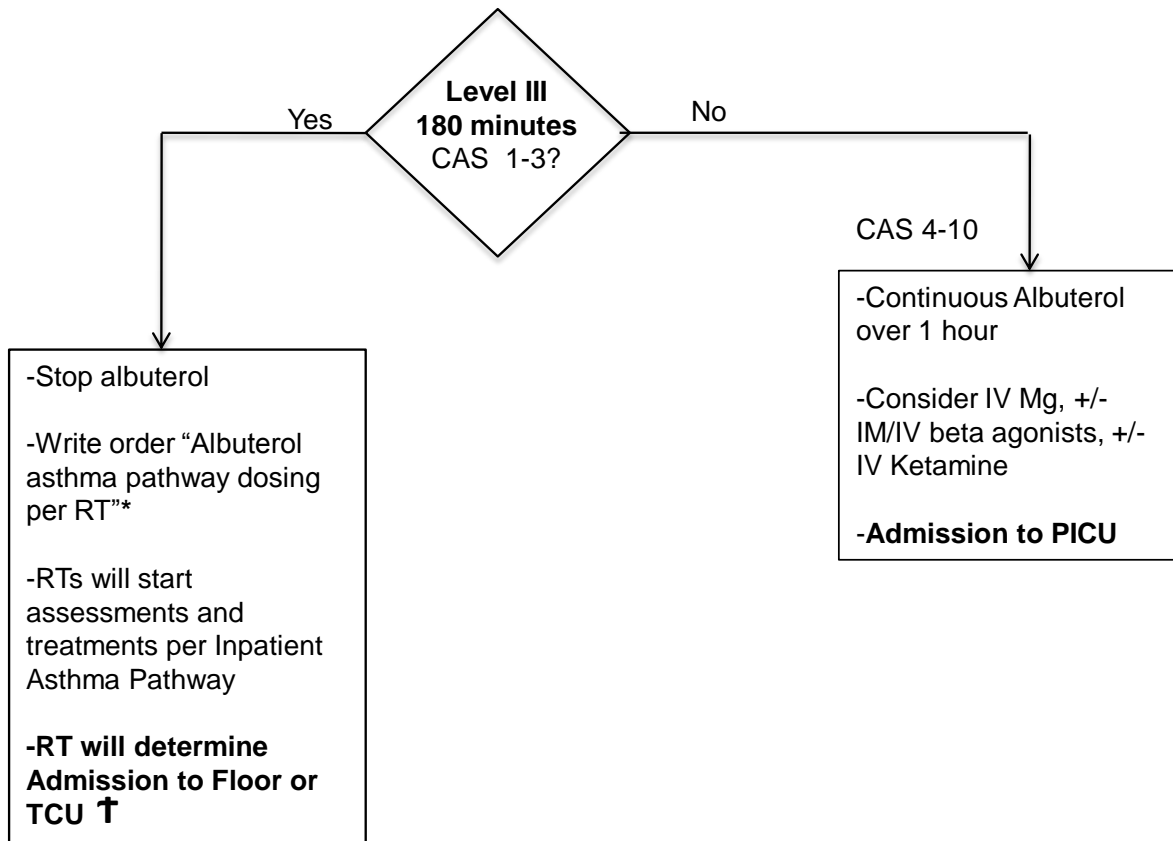
- 1) Patients are assessed using the CAS upon presentation to ED, then subsequently each hour until discharge, or **admission decision at 180 minutes (3 hours)**.
- 2) Therapy is based on flow chart on the following pages.
- 3) Respiratory Therapy will come to the ED, CAS will be applied, and then discuss the appropriate admission unit with the ED Physician.











**\* For ALL Asthma Admissions: Prior to entering "Place Patient In" Admission Order into EPIC:**

- Order "Albuterol asthma pathway dosing order per RT" and await Respiratory Therapy's agreement with appropriate disposition destination

**† Prior to entering "Place Patient In" Admission Order in EPIC for TCU Admits:**

- Have Unit Secretary text page pediatric floor resident "TCU admission in the ED", then verbal communication with floor resident

## Nebulization and Steroid Dosing During 1<sup>st</sup> Hour

CAS Score	Duration	Wt < 20 kg	Wt ≥ 20 kg	Comments
<b>0 – 2</b>	5 -15 min	Albuterol 2.5 mg/ 0.5 ml in 3 ml NS @8-10 L	Albuterol 5 mg/1ml in 3 ml NS @8-10 L	RN to initiate if RT not available within 15
<b>3 – 4</b> [Place on continuous oximetry]	Continuous over 1 hour	Albuterol 10 mg/2ml + Atrovent 750 mcg/ 3.75 ml in 19 ml of NS [total 25 ml] @ 10 L  Oral steroids 2 mg/kg up to 60 mg	Albuterol 20 mg/4ml + Atrovent 1500 mcg/ 7.5 ml in 13.5 ml NS [total 25 ml] @ 10L  Oral steroids 2 mg/kg up to 60 mg	RN to initiate if RT not available within 15 min. Notify attending.
<b>5 – 10</b> [Place on continuous oximetry]	Continuous over 1 hour	Albuterol 10 mg/2ml + Atrovent 750 mcg/ 3.75 ml in 19 ml of NS [total 25 ml] @ 10 L  IV Steroids 2 mg/kg up to 125 mg of Solumedrol	Albuterol 20 mg/4ml + Atrovent 1500 mcg/ 7.5 ml in 13.5 ml NS [total 25 ml] @ 10L  IV Steroids 2 mg/kg up to 125 mg of Solumedrol	RN to initiate if RT not immediately available. Notify attending to see patient immediately.

# Cardinal Glennon Children's Medical Center

## Asthma Care in the Emergency Department

Asthma is a major public health problem of increasing concern in the United States. From 1980 to 1996, asthma prevalence among children increased by an average of 4.3% per year, from 3.6% to 6.2%. Low-income populations, minorities, and children living in inner cities experience disproportionately higher morbidity and mortality due to asthma. Asthma's effects on children and adolescents include the following:

- Asthma accounts for 14 million lost days of school missed annually.
- Asthma is the third-ranking cause of hospitalization among those younger than 15 years of age.
- The number of children dying from asthma increased almost threefold from 93 in 1979 to 266 in 1996.
- The estimated cost of treating asthma in those younger than 18 years of age is \$3.2 billion per year.

Environmental Hazards & Health Effects: Asthma. [www.cdc.gov/asthma/children.htm](http://www.cdc.gov/asthma/children.htm)

### **The pathophysiology of asthma is composed of:**

- Bronchoconstriction by bronchial smooth muscle contraction
- Airway edema
- Airway hyper-responsiveness
- Airway remodeling

### **Emergency department management of asthma includes:**

- Oxygen to maintain pulse oximetry >90%
- Short acting beta agonist therapy in the form of repetitive or continuous administration: three treatments spaced every 20-30 minutes or continuous administration
- Inhaled ipratropium bromide particularly for patients with severe airflow obstruction
- Corticosteroids by the parenteral or oral routes
- Intravenous Magnesium Sulfate
- IV/IM/SQ beta agonists (Terbutaline, Epinephrine)
- IV/IM Ketamine

## **Unproven Therapy:**

- Methylxanthines (theophylline/amiophylline) is not recommended though it may be utilized as an aggressive measure to stave off intubation
- Antibiotics
- Routine chest radiographs
- Aggressive hydration
- Chest physical therapy
- Mucolytics

## **Emergency Department Asthma Care Pathway**

### **Who Qualifies:**

1) Children older than 2 years of age with a prior history of wheezing, and 2) Children less than 2 years of age with likely asthma rather than acute bronchiolitis

### **Who Does NOT Qualify:**

Children with unstable heart disease or suspicion of other reasons for wheezing, such as a laryngomalacia, tracheomalacia, or foreign body

**Step 1:** Obtain vital signs, pulse oximetry and height in children older than 6 years.

**Step 2:** Determine asthma score: Modified CAS (Woods and Downes)

**Step 3:** Treatment as Follows:

### **Asthma score < 1- 2**

- a. Nurse to assign Triage ESI 3
- b. Order a single albuterol nebulizer treatment of 5 mg for children weighing  $\geq 20$  kg., or 2.5 mg for children < 20 kg.
- c. The RN should initiate the treatment if respiratory therapy has not arrived within 15 minutes

### **Asthma score 3 to 4**

- a. Nurse to assign Triage ESI 3
- b. Place the child on continuous pulse oximetry
- c. Order a continuous nebulization treatment with albuterol and atrovent to run over 1 hour
  - i. For children  $\geq$  20 kg, albuterol 20 mg and atrovent 1500 mcgs
  - ii. For children  $<$  20 kg, albuterol 10 mg and atrovent 750 mcgs
- d. The RN should initiate the treatment if respiratory therapy has not arrived within 15 minutes.
- e. Request the respiratory therapy check post treatment peak flows in children 6 year age and older
- f. Order and administer 2 mg/kg of oral steroid (form at the discretion of the RN) with a maximum of 60 mg. Notify MD if unable to tolerate PO dose.
- g. Notify the attending or fellow of patient's enrollment in the pathway and when the nebulization treatment is complete.

### **Asthma score $\geq$ 5**

- a. Nurse to assign Triage ESI 2
- b. Place the child on continuous pulse oximetry
- c. The RN initiates a continuous nebulization treatment if respiratory therapy is not immediately present.
- d. Notify the attending or fellow of patient's enrollment and need for their immediate presence at the bedside.
- e. Administer IV Solumedrol 2 mg/kg (maximum 125 mg)
- f. Consider IV Magnesium, IV/IM/SQ Beta Agonists (Terbutaline, Epineprine), and/or IV/IM Ketamine:
  - i. **Magnesium:** 25 - 50 mg/kg IV up to 2 grams
  - ii. **Terbutaline:**
    - 2 – 10 mcg/kg IV load followed by 0.1 – 0.4 mcg/kg/min. (May titrate in increments of 0.1 – 0.2 mcg/kg/min Q 30 min)
    - 10 mcg/kg (1 mg/ml), maximum 0.25 ml IM/SQ x 1; may repeat x 1 in 20 minutes for maximum of 2 doses
  - iii. **Epinephrine:**
    - 0.1 ml/kg (0.01 mg/kg) IV load (1:10,000) followed by 0.1-1.0 mcg/kg/min
    - 0.01 ml/kg (0.01 mg/kg/dose) IM/SQ (1:1,000), maximum 0.5 ml IM/SQ, x 1; may repeat q 20 minutes for maximum 3 doses
  - iv. **Ketamine:**
    - 0.5 mg/kg/dose (maximum 25 mg) IV/IM

## **Admission of asthma patients:**

The pathway for admission of patients to the appropriate unit in the hospital is outlined in the ED to Inpatient Asthma Pathway.

## **Discharge from the emergency department requires that:**

- CAS 0 – 1 (With ED physicians discretion when CAS = 1)
- The patient is not hypoxic
- If the patient is able to perform an appropriate peak flow it should be greater than or equal to 70% of predicted (available in table format with peak flow meters)
- The patient is comfortable and is able to tolerate oral meds and fluids as well as inhaled bronchodilators
- The above conditions remain stable 30 to 60 minutes after the last nebulized treatment

## **Discharge medications:**

- Inhaled bronchodilator (albuterol via a home nebulizer or MDI) including education in the use of an MDI as indicated. Albuterol: MDI: 2 – 4 puffs, Nebulizer: 2.5 mg.
- Oral corticosteroids (1- 2 mg/kg/day, max. of 60 to 80 mg/day) for 4 to 5 days
- Continuation of any current asthma medications (long term bronchodilators, inhaled corticosteroids, etc)
- Consider adding an inhaled corticosteroid for patients with persistent disease
- Follow-up with a health care provider within 1 week