

Asthma Care in the Emergency Department

Clinical Practice Guideline

Protocol Approved by: Division of Pediatric Emergency Medicine

Date(s) of Approval: March 5, 2015

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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:

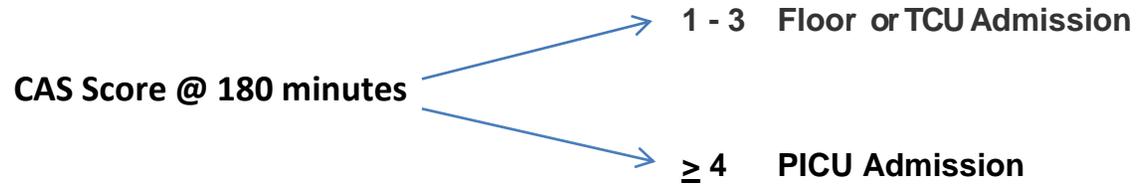
Clinical Asthma Score (CAS)

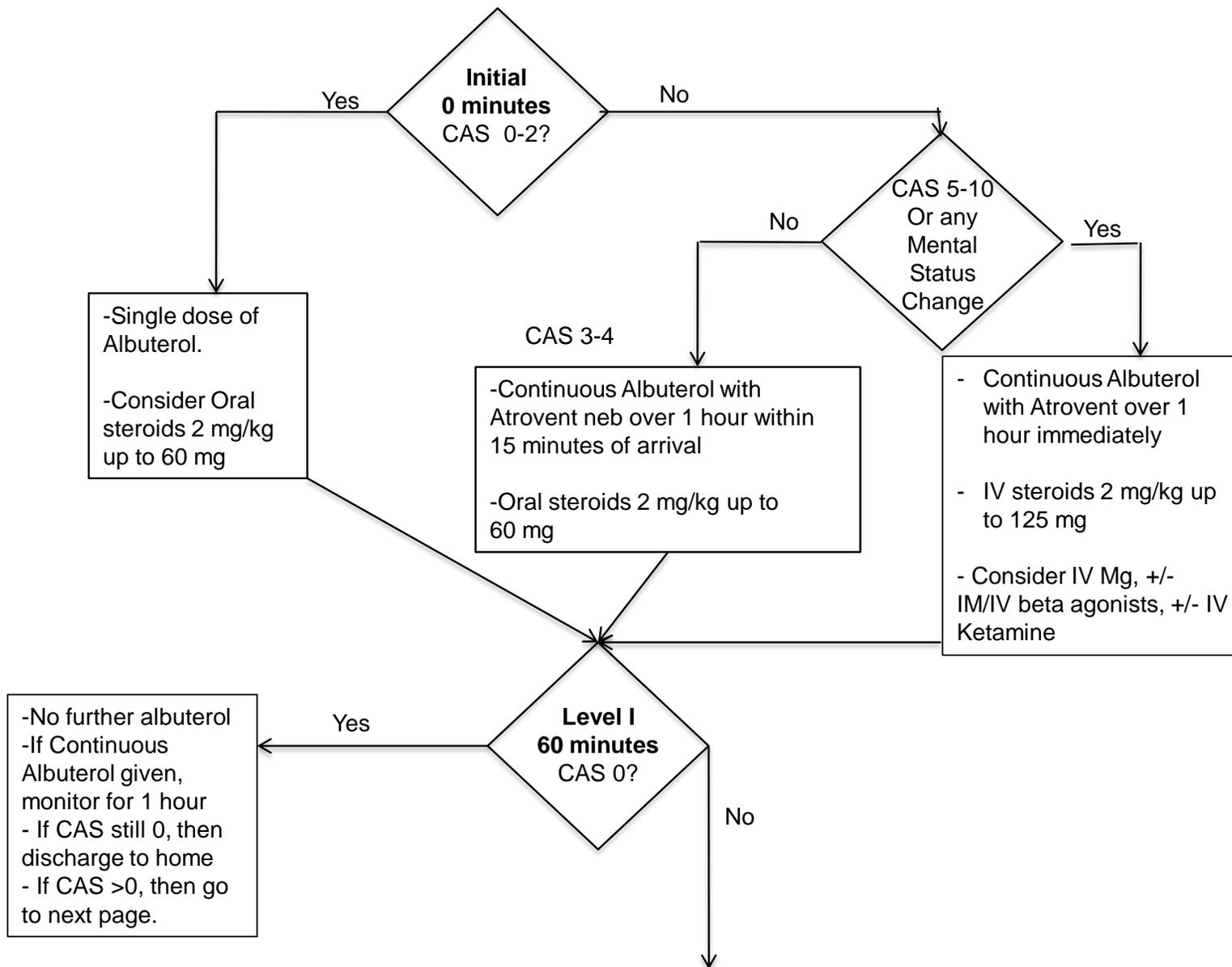
Score points	SpO2	Auscultation	Accessory Muscle Use/Retractions	Inspiratory breath sounds	Dyspnea
0	>95% on room air	None or end expiratory wheezes	None	Normal	Speaks in sentences/ coos and babbles
1	90-95% on room air	Wheezing through entire expiratory phase	Substernal/ subcostal/ intercostal/ nasal 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

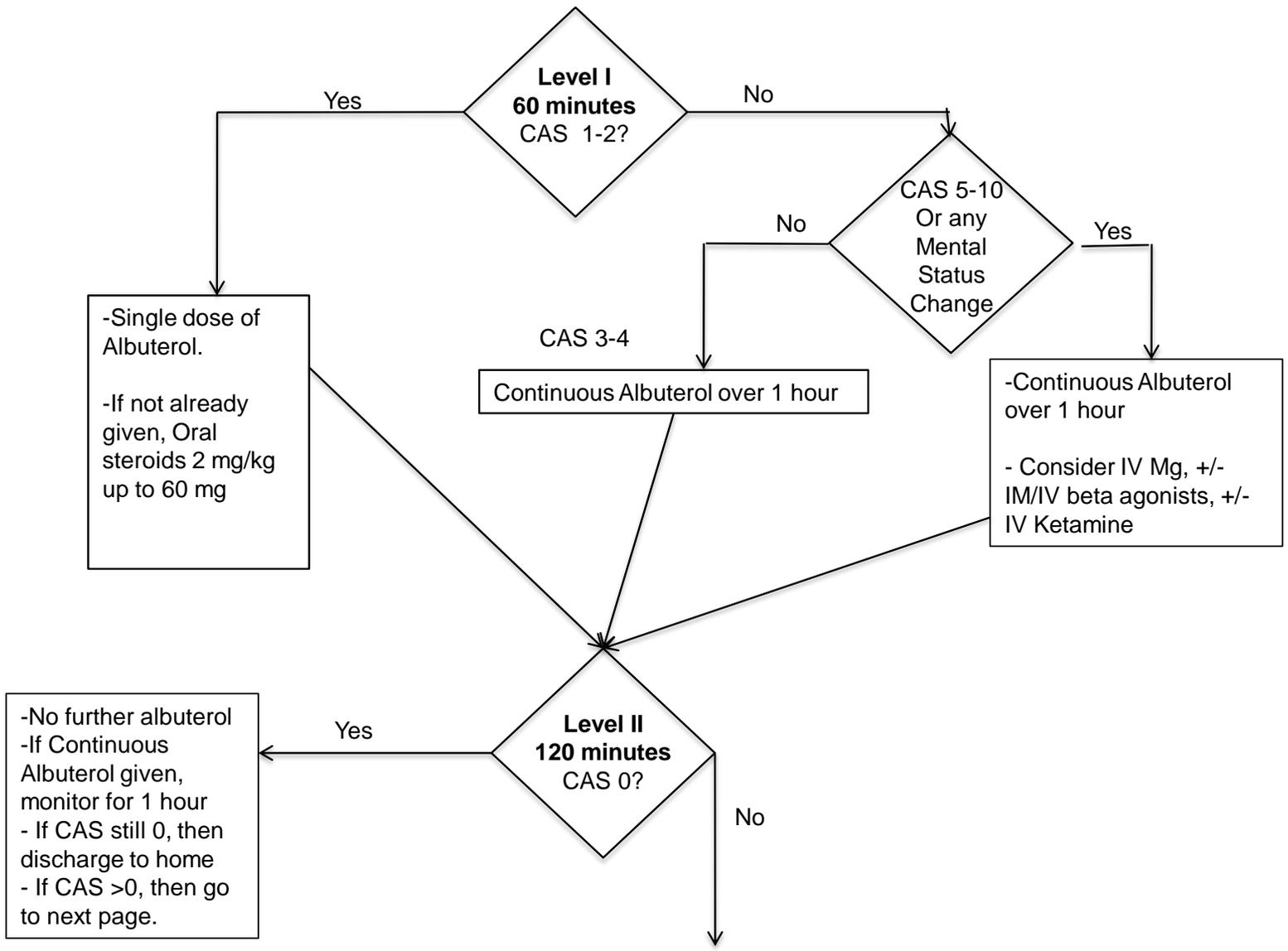
ED to Inpatient Admission Pathway

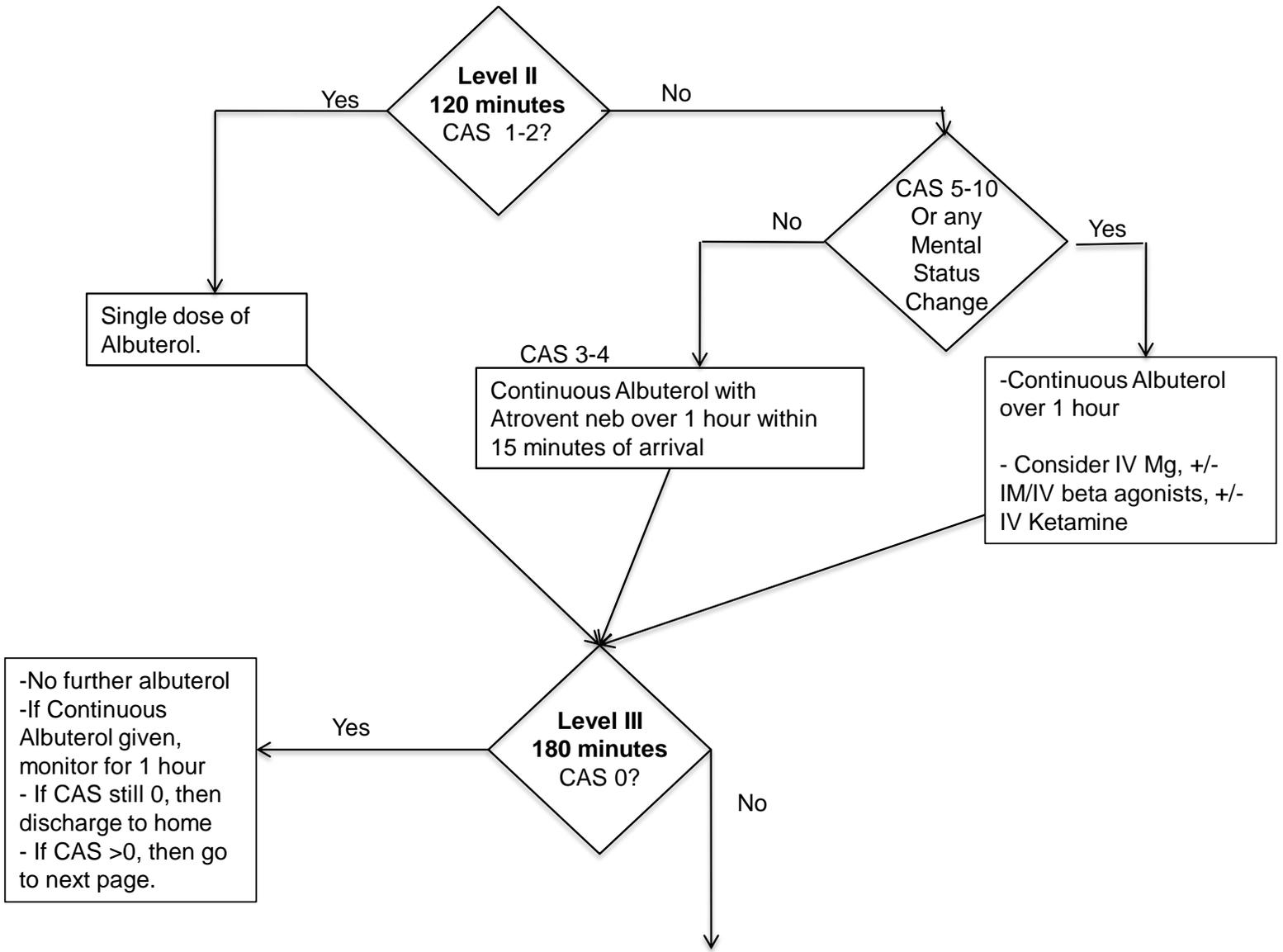
Key Points:

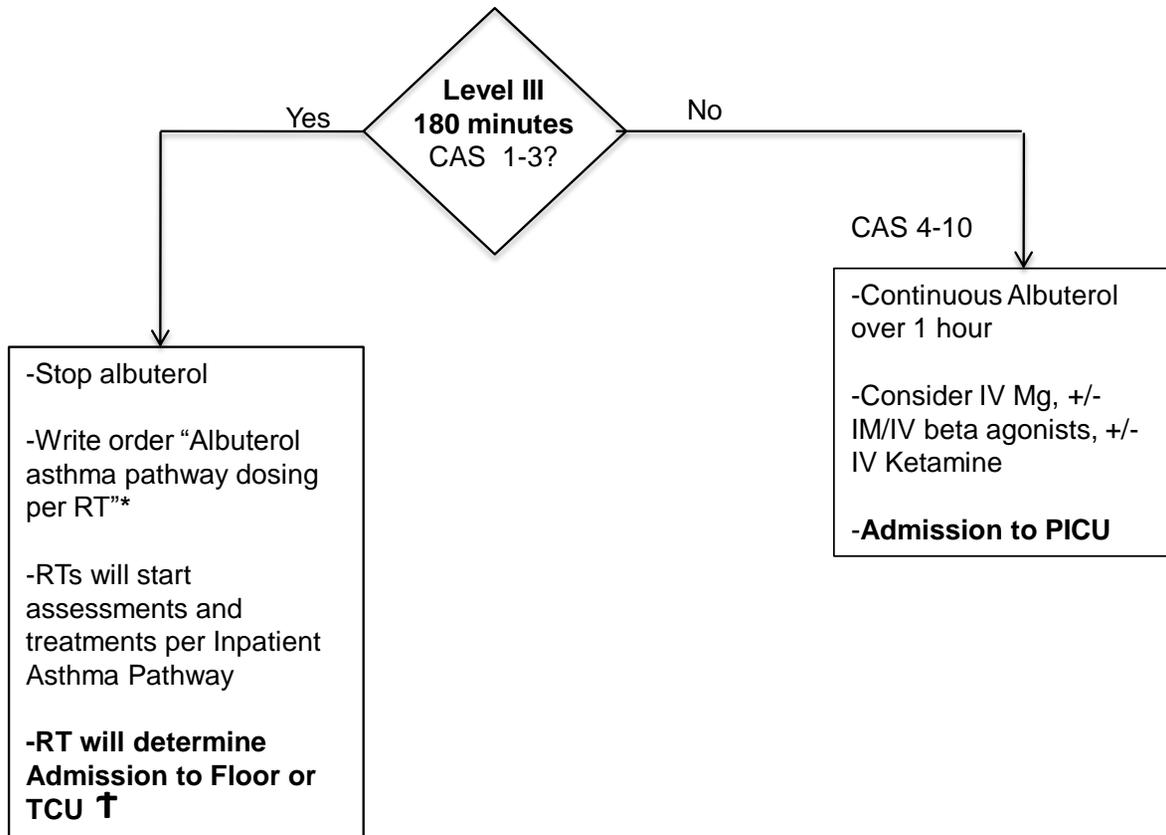
- 1) Patients are assessed using the CAS upon presentation to ED, then subsequently each hour until discharge, or **admission decision at 180 minutes (3 hours)**.
- 2) Therapy is based on flow chart on the following pages.
- 3) Respiratory Therapy will come to the ED, CAS will be applied, and then discuss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

CAS Score	Duration	Wt < 20 kg	Wt ≥ 20 kg	Comments
0 – 2	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
3 – 4 [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.
5 – 10 [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

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 ≥ 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 ≥ 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 ≥ 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