ASTHMA PATHWAY GUIDELINES

Definition:
Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role. The chronic inflammation is associated with airway hyper responsiveness that leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing. Symptoms may worsen in the evening or in the morning. (GINA Global Strategy for Asthma Management and Prevention, 2012) Asthma is one of the most common chronic disorders in children and is one of the leading causes of school absenteeism.

Etiology:
Although the exact etiology of asthma is unknown, environmental factors and allergens are known factors influencing exacerbations.

Differential Diagnosis:
GERD
Other causes of chronic aspiration
Recurrent VLR
Sinusitis
Foreign body aspiration

Guideline Eligibility Criteria:
Patients 2 to 18 years of age with acute asthma exacerbation

Guideline Exclusion Criteria:
Bronchiolitis
Cystic Fibrosis
Tracheostomy
Neuromuscular disease
Immunodeficiency
Cardiac disease
Other Chronic Lung Disease (unless otherwise specified)

Diagnostic Evaluation:
History and physical pertinent to the exacerbation should be completed concurrently with prompt initiation of treatment. (GINA Global Strategy for Asthma Management and Prevention, 2012)

History:
Assess for severity and duration of symptoms, medication history, risk factors and common times or exacerbations to an onset of symptoms.

Physical Examination:
To include- assessment of dyspnea, respiratory rate, work of breathing, presence and location of wheezing, need for oxygen

Laboratory Tests:
None recommended for uncomplicated asthma exacerbation

Critical Points of Evidence

Evidence Supports
Use of a common scoring tool and pathway to categorize severity and improve clinical outcomes
Oxygen for saturation consistently below 90%
Short acting beta-agonist as soon as possible
Glucocorticosteroids within the first hour of arrival to hospital/ED
Ipratropium bromide for moderate to severe asthma
Intravenous magnesium sulfate for treatment of moderate to severe asthma

Evidence Lacking/Inconclusive
Terbutaline and epinephrine should be given only if aerosolized treatments are not tolerated or patient has not been response to treatments listed above
Non-Invasive positive pressure ventilation prior to intubation

Evidence Against
Chest x-ray not recommended for routine cases
Blood gas
Heliox

Practice Recommendations
Treatments for asthma have been widely studied and recommendations adopted based on studied and recommended standards of care. Many of these standards of care have been adopted by the Joint Commission since 2007 and were set forth as Orynx measures for pediatric healthcare agencies.

Common Asthma Scoring Tool: Modified Quereshi PAS
Measuring response to therapy can be a very useful tool in the management of asthma. No universal pediatric asthma scoring tool has been identified as superior, but there are several in the literature that have been validated and implemented in clinical practice. Our institution has adopted a modified version of the Quereshi Pediatric Asthma Score.
Treatment Recommendations
(for full recommendations see attached pathway and addendums)

Beta-agonist dosing (albuterol)

Emergency Department (PAS score Q1 hour)

1st hour
- Mild (PAS 0): No treatment required
- Mild (PAS 1-2): Albuterol 5mg Neb
- Moderate (PAS 3-5): Albuterol Neb over 1 hour (<20 kg: 10mg Neb or ≥20kg: 15mg Neb)
- Moderate to Severe (PAS 6-10): Albuterol Continuous (<20 kg: 10mg Neb or ≥20kg: 15mg)

2nd hour
- Mild (PAS 0-2): Discharge home
- Moderate (PAS 3-5): Albuterol Neb over 2 hours (<20 kg: 10mg Neb or ≥20kg: 15mg Neb)
- Moderate to Severe (PAS 6-7): Albuterol over 1 hour (<20 kg: 10mg Neb or ≥20kg: 15mg)
- Severe (PAS 8-10): Albuterol Continuous (<20 kg: 10mg Neb or ≥20kg: 15mg)

3rd hour
- Mild (PAS 0-2): Discharge home
- Moderate (PAS 3-5): Albuterol Neb over 1 hour (<20 kg: 10mg Neb or ≥20kg: 15mg Neb)
- Moderate to Severe (PAS 6-7): Albuterol over 1 hour (<20 kg: 10mg Neb or ≥20kg: 15mg)
- Severe (PAS 8-10): Albuterol Continuous (<20 kg: 15mg Neb or ≥20kg: 20mg)

Inpatient (PAS score Q4hr unless otherwise noted)
- Mild: Albuterol Q4 hours (8 puffs w/inhaler)
- Moderate: Albuterol Q3 hours (<20 kg: 5 mg Neb or ≥20kg: 7.5 mg Neb)
- Moderate to Severe: Albuterol Continuous (<20 kg: 10 mg Neb or ≥20kg: 15 mg Neb, with 2hr PAS scores at minimum)
- Severe: Albuterol Continuous (<20 kg: 15 mg Neb or ≥20kg: 20 mg Neb, with 2hr PAS scores at minimum)

Steroids

There is strong evidence that corticosteroids speed the resolution of airflow obstruction and reduce rate of relapse, especially if given within the first hour of admission to ED.

- **Recommended: Dexamethasone** has shown to be just as effective as prednisolone and has the added benefit of decreased vomiting and less doses, thus increasing compliance.
  - Dosing: Dexamethasone 0.6 mg/kg PO/IM/IV (max: 16 mg) every day x2 doses (Separate the 2 doses by 24-36 hours)
  - For dexamethasone allergy or intolerance: Prednisolone
    - Dosing: Prednisolone 1 mg/kg (max: 30 mg/dose) for <12 yrs OR 40 mg/dose for ≥ 12 yrs) PO Q12hr For 5 days
  - Severe exacerbations
    - **Methylprednisolone**
      - Initial Dose: Methylprednisolone 2 mg/kg IV x1 (max: 60 mg)
        - (skip this step if methylprednisolone or dexamethasone already given)
      - 6 hours later: methylprednisolone 1 mg/kg IV Q6hr (max: 60mg/dose)
    - Full recommendations and methylprednisolone weaning instructions are supplied in addendum 1

Ipratropium Bromide

Strongly recommended as an adjunctive therapy for patients with moderate to severe symptoms

- Dosing: Ipratropium 1 mg via neb- in conjunction with Albuterol in the 1st hour

Magnesium Sulfate

Strong recommendation to be used as an adjunctive therapy when there is no response to conventional therapies.

- Dosing: Magnesium Sulfate 50 mg/kg IV (max 2 g) over 20-30 min. x1
  - Strongly consider NS bolus if not already given
  - Only one dose may be administered on acute care units, other than pediatric intensive care, in a 24 hour period

Terbutaline

Terbutaline and epinephrine should be given only if aerosolized treatments are not tolerated or patient has not been response to treatments listed above

- Dosing: 10mcg/kg SQ (Max 250mcg=0.25ml) X1 for child in extremis (can be given Q 20minutes x3 doses until IV established)
  - If considering IV Terbutaline it must be ordered in concert with STAT PICU consult
  - Recommended starting dose: 10 mcg/kg (max 250 mcg) IV load over 15 minutes
  - followed by continuous IV drip 0.4 mcg/kg/min
  - STAT call to Pharmacy for IV drip Terbutaline

Pediatric Intensive Care ONLY

Pepcid PO or IV per Protocol

- Pepcid should be administered PO when the patient is tolerating feeds/diet, discontinue upon transfer to floor

Ketamine

- Dosing Ketamine 2mg/ml, 5 mcg/kg/minute continuous IV drip (titrate per protocol to meet sedation needs)
Admission Criteria
Supplemental oxygen requirement
No improvement to baseline after multiple respiratory treatments
Stage 1 (Score 1-2) = Acute Care Unit
*Note: Discharge is recommended for scores of 0-2, admission will only occur for score 0-2 if oxygen is required or there is concern for deterioration
Stage 2 (Score 3-5) = Acute Care Unit
Stage 4 (Score 6-7) = Pulmonary Unit
Stage 5 (Score 8-10) = Pediatric Intensive Care Unit

Consults and Referrals
Pulmonology for patients with chronic symptoms and multiple admissions

Infection Control
Standard isolation only unless viral factors are suspected

Caregiver Education
Children should not be exposed to passive smoke, explore smoking cessation opportunities as indicated
Emphasize importance of follow-up appointments
Emphasize importance of following recommendations on the Home Management Plan of Care (HMPOC)

Discharge Criteria
Albuterol: 8 puffs or 5 mg Q4 times 1 dose
Oxygen Saturation >90 for more than 2 hours

Follow-Up Care
Generally follow-up care is 1-2 days post discharge with the primary care doctor

Prevention
Caregiver and patient knowledge of HMPOC
Knowledge of common triggers and how to prepare or avoid
Proper use and understanding of inhaled corticosteroids and controller medications
Asthma Action Plan

Outcome Measures
Emergency Department (ED):
Time from ED triage to administration of beta agonist
Time form ED triage to administration of steroids
Proportion receiving 1st neb within 60 minutes of arrival
Proportion receiving steroid within 60 minutes of arrival
Proportion of patients assessed for understanding of HMPOC
Readmissions to ED within 30 days and within 12 months
Inpatient (IP):
Proportion of patients with a documented home management plan of care
Proportion of patients assessed for their understanding of HMPOC
Average length of stay
**If RESPIRATORY ARREST IMMINENT-**
Triage and Initiate care in resuscitation room

**Exclusion Criteria:**
bronchiolitis, cystic fibrosis, tracheostomy patients, neuromuscular diseases, immunodeficiency & cardiac patients (unless ordered), and other chronic lung disease (unless ordered)

**Induction Criteria:**
Patients 2-18 years of age with acute asthma exacerbation

- Supplemental Oxygen should be administered to maintain SaO2 >90%
- Initial PAS score done at triage and on room placement

**If RESPIRATORY ARREST IMMINENT-**
Triage and Initiate care in resuscitation room

**Induction Criteria:**
Patients 2-18 years of age with acute asthma exacerbation

- Supplemental Oxygen should be administered to maintain SaO2 >90%
- Initial PAS score done at triage and on room placement

**1st HOUR**

PAS 1-2
- Albuterol 5 mg Neb
- Repeat per clinician discretion
- Consider Steroids in some cases- consult with physician

PAS 3-5
- Albuterol Neb over 1 hour
  - <20 kg: Albuterol 10 mg/20 kg: Albuterol 15 mg
- IPratropium 1 mg via Neb in conjunction with Albuterol
- Dexamethasone 0.6 mg/kg (max 16 mg) PO/IM or Methylprednisolone 2mg/kg (max 60mg) IV for PO intolerant

**2nd HOUR**

PAS 0-2
Discharge to HOME
- Asthma Action Plan
- Asthma Education to include Smoking Cessation referral if indicated
- Re-label Albuterol
- Script for Controller Meds, if applicable
- Script for Dexamethasone Dose 2-0.6mg/kg (max 16mg) PO x 1 to be given 24 hours after 1st dose, if applicable

PAS 3-5
Admit to FLOOR
- <20 kg: Albuterol 10 mg Neb Q2h
- >20 kg: Albuterol 15 mg Neb Q2h

PAS 6-7
Admit to Pulmonary Unit (see Addendum 5 for Pulmonary Unit exclusion criteria)
- <20 kg: Albuterol 10 mg Neb over 1 hour
- >20 kg: Albuterol 15 mg Neb over 1 hour
- **Consider adjunctive therapy**

**3rd HOUR**

PAS 0-2
Discharge to HOME
- See above recommendations

PAS 3-5
Admit to FLOOR
- <20 kg: Albuterol 10 mg Neb Q2h
- >20 kg: Albuterol 15 mg Neb Q2h

**Reassess PAS Score- If completing a continuous neb and considering discharge home it is RECOMMENDED that you observe the patient for at least 60 minutes after the completion of the neb, then re-score the patient for discharge readiness.**

****ADJUNCTIVE THERAPY OPTIONS**

- **IV NS bolus** (20mL/kg, max 1L)
- **Magnesium Sulfate** 50 mg/kg IV (max 2 g) over 20-30 min. x1
  - Strongly consider NS bolus if not already given
- **Terbutaline** 10mcg/kg SQ (Max 250mcg=0.25ml) X1 for child in extremis (can be given Q 20minutes x3 doses until IV established)
- If considering IV Terbutaline
  - Must be ordered in concert with STAT PICU consult
  - Recommended starting dose:
    - 10 mcg/kg (max 250 mcg) IV load over 15 minutes, followed by: Terbutaline continuous IV drip 0.4 mcg/kg/min
  - STAT call to Pharmacy for IV drip Terbutaline

**Assessment**
0 1 2
Respiratory Rate (Obtain over 30 seconds and multiply x2)
- 2-3 years old ≤34
- 4-5 years old ≤30
- 6-12 years old ≤26
- >12 years old ≤23

O2 Oxygen Requirement
- (max for 2min return O2 if Sats <90)
- >95% RA 90-95% RA <90% RA

A Auscultation
- BBS clear to End exp. wheeze
- Expiratory Wheezes
  - Insp. & Exp. wheeze or Diminished BS

W Work of Breathing
- ≤ 1 accessory muscle
- 2 accessory muscles
- ≥3 accessory muscles

D Dyspnea
- speaks full sentences, playful, babbles
- Speaks partial sentences, short cry
- Speaks short phrases, single words, grunting

**For questions concerning this pathway, Click Here**
Last Updated March 20, 2019

**IF TRANSFER BED UNAVAILABLE FOLLOW THE INPATIENT ASTHMA PATHWAY GUIDELINES**
Inpatient Asthma Pathway Guidelines

- Reassess PAS score with every treatment
- Supplemental O2 to maintain SaO2 >90%
- Smoking cessation counseling when indicated

**STAGE 1**
**PAS Score 1-2**
**Acute Care**
Mild

- Albuterol Q4 hours 8 puffs w/inhaler
- Clinical Readiness for Discharge
  - Albuterol: 8 puffs or 5 mg Q4 times 1 dose
  - Oxygen Saturation >90 for more than 2 hours
- Items Required for Discharge Home (see addendum 4)

**STAGE 2**
**PAS Score 3-5**
**Acute Care**
Moderate

- Albuterol Q3 hours <20 kg: 5 mg Neb ≥20 kg: 7.5 mg Neb
- Clinical Readiness for Discharge
  - Albuterol Continuous Q2 hours 8 puffs Q2: 10 mg Neb ≥20 kg: 15 mg Neb (with Q2hr PAS scores at minimum)

**STAGE 3**
**WEANING Guidelines:**
- From PU or PICU to moderate score treatments
  - PAS SCORE ≤ 5 at Q2 RT Assessment (RT will suspend continuous Neb, rescore the pt in 2 hours, and begin Q2 hour dosing)
- Order Steroids per Addendum 1
- Day team to classify patient: if symptoms qualify, order controller (see addendum 2 & 3)

**STAGE 4**
**PAS Score 6-7**
**Pulmonary Unit**
Moderate to Severe

- Albuterol Continuous (max: 8 doses)
  - <20 kg: 10 mg Neb ≥20 kg: 15 mg Neb (with Q2hr PAS scores at minimum)
- Clinical Readiness for Discharge
  - Magnesium Sulfate: 50 mg/kg IV (max: 2 grams) may be given over 20-30 minutes x1 if not given in ED Max: 1 dose per 24 hour period
- Order Steroids per Addendum 1
- Day team to classify patient: if symptoms qualify, order controller (see addendum 2 & 3)

**STAGE 5**
**PAS Score 8-10**
**PICU**
Severe

- Albuterol Continuous <20 kg: 15 mg Neb ≥20 kg: 20 mg Neb (with Q2hr PAS scores at minimum)
- Clinical Readiness for Discharge
  - See Pediatric Intensive Care Asthma Pathway Guidelines

**Units for Admission and Transfer**

- **Stage 1 (Score 1-2)** = Acute Care Unit
- **Stage 2 (Score 3-5)** = Acute Care Unit
- **Stage 4 (Score 6-7)** = Pulmonary Unit
- **Stage 5 (Score 8-10)** = PICU team

**Albuterol to MDI w/ Spacer**

- **Puff Conversions**
  - 5 mg neb = 8 puffs
  - 10 mg neb = 16 puffs
  - Continuous: 5 puffs Q20min. x3
  - Q2 hours: 4 puffs Q30 minutes x 4
  - Q3 hour: 5 puffs Q1 hour x 3
  - 15 mg Neb = 24 puffs
  - Continuous = 8 puffs Q20 min. x3
  - Q2 hours = 6 puffs Q30 minutes x 4
  - Q3 hour = 8 puffs Q1 hour x 3

Patients should show score improvement within 8 hours of admission. If no improvement, contact physician for reevaluation consider CC consult

For questions concerning this pathway, Click Here

Last Updated March 20, 2019
Inclusion criteria:
- Patients 2-18 years of age with acute asthma exacerbation
- Poor responders to treatment
- Patients in Extremis
- Patients Scoring 8 or higher on the PAS
- Patients not showing improvement within 6 hours of admission to the Pulmonary High Acuity Unit

Standards of Care (care every patient will receive)

- **Ipratropium Continuous Nebulizer**:
  - PAS 8-10: <20kg= 15 mg/hr or >20kg= 20 mg/hr
  - PAS 6-7: <20kg= 10 mg/hr or >20kg= 15 mg/hr once patient is weaned from terbutaline & magnesium sulfate drip
  - Respiratory Therapy will score the patient, at a minimum, every two hours
  - Respiratory Therapy will contact the Physician/ Mid-level/ Resident for weaning orders

  *Please see the Inpatient Asthma Pathway Guidelines for dosing once patient is deemed ready to be off continuous nebs*

- **Methylprednisolone**: 1 mg/kg IV Q6 hours x 24 hours (max: 60mg per dose)
  - (see Addendum 1 for methylprednisolone management and weaning guidelines)

- **Pepcid PO or IV per protocol**
  - (Pepcid should be administered PO when the patient is tolerating feeds/diet, discontinue upon transfer to floor)

- **Ipratropium**: <20kg- 0.25 mg or >20kg- 0.5 mg inhaled Q6 hours x 24 hours

- **Magnesium Sulfate**: 50 mg/kg IV (2 grams max) over 20-30 minutes (if not given in ED or Pulmonary High Acuity Unit)

Medications for Refractory Treatment

- **Ipratropium**: <20kg- 0.25 mg or >20kg- 0.5 mg inhaled Q6 hours, may continue per physician discretion if necessary

- **Terbutaline 1mg/ml**: Loading dose 10mcg/kg (max: 250mcg) over 15 minutes followed by continuous IV drip 0.4 mcg/kg/minute

  *Terbutaline drip should be weaned completely before weaning continuous Albuterol*

- **Magnesium Sulfate 50mg/ml**: <30kg- 25 mg/kg/hr or >30kg- 20 mg/kg/hr continuous IV drip (max: 2g per hour)
  - Check serum magnesium 2 hours after the drip is started then Q8 hours (serum magnesium target = 3-5 mg/dL)
  - Titrate by 5mg/kg/hr based on serum levels

- **Ketamine 2mg/ml**: 5 mcg/kg/minute continuous IV drip

  *Titrate per protocol to meet sedation needs*

Recommendations for Discharge or Transfer out of the Pediatric Intensive Care Unit

- **DISCHARGE HOME**
  - PAS 1-2 (ready for discharge home)- See addendum 4 for Discharge Readiness Criteria and Requirements

- **ADMIT TO FLOOR**
  - PAS 1-2 (NOT ready for discharge home)
  - PAS 3-5

- **ADMIT TO PULMONARY UNIT**
  - PAS 6-7 (for patients exhibiting steady improvement)
### Pediatric Asthma Albuterol Titration Protocol Severity Score Sheet

**Respiratory Rate**

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<th>Age Group</th>
<th>Respiratory Rate</th>
<th>Rate</th>
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**Room Air SpO₂**

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**Work of Breathing**

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<td>3 or Greater Accessory Muscles</td>
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**Dyspnea**

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**Total Asthma Severity Score (0-10)**

- **Asthma Protocol Stage (RT ONLY)**
- **Albuterol Dose Given (mg) (RT ONLY)**

**Next Assessment Time**

**Signature**

**Patient Label**

*Dell Children's Medical Center of Central Texas*
ADDENDUM 1:
Ordering and Weaning Instructions for Steroid Management in Asthma

**Mild to Moderate**
PAS Score 3-7
In 2nd hour

**Severe Exacerbation**
PICU

---

**Dexamethasone 0.6 mg/kg PO/IM/IV**
*(max: 16 mg) Qday X2 doses*
(includes the dose in ED)
Separate the 2 doses by 24-36 hours.

**Alternative for allergies and Intolerance only**
Prednisolone 1 mg/kg
*(max: 30mg/dose <12 yrs or 40 mg/dose ≥12 yrs)*
PO Q12hr for 5 days

---

**Initial Dose:** Methylprednisolone
2 mg/kg IV x1 *(max: 60 mg)*
*(skip this step if Methylprednisolone or Dexamethasone already given)*

THEN 6 hour later

**Methylprednisolone 1 mg/kg IV**
Q6hr *(max: 60mg/dose)*

When patient off Terbutaline gtt AND continuous Albuterol

Methylprednisolone Q6hr
< 5 days wean to

Methylprednisolone Q6hr
≥ 5 days wean to

---

**Patients started on methylprednisolone (Solumedrol) should complete their steroid course with prednisolone (Orapred).**

**Exception:**
If patient has received only one dose of methylprednisolone then they can receive the 2 doses of dexamethasone (Decadron) as is outlined in the ED and Inpatient Pathways.

---

Methylprednisolone 1 mg/kg IV
*(max: 60mg/dose) OR*
Prednisolone 1mg/kg PO
*(max: 30mg/dose <12 yrs or 40 mg/dose ≥12 yrs)*
Q8hr for 1 day
*(May skip this step if the patient is improving rapidly.)*

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Prednisolone 1 mg/kg PO Q12hr
*(max: 30mg/dose <12 yrs or 40 mg/dose ≥12 yrs)*
Continue 3-8 days- duration based on severity of asthma exacerbation

---

Prednisolone 1 mg/kg PO Q12hr
for 3-5 days
*(max: 30mg/dose <12 yrs or 40 mg/dose ≥12 yrs)*

Wean to

Prednisolone 0.5 mg/kg PO
*(max: 20mg/ dose)*
Q12hr for 3-5 days

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For questions concerning this pathway,
Click Here
Last Updated September 21, 2015
Addendum 2:
Ordering Instructions for Inhalers at Discharge

Start controller for ALL ASTHMATICS classified with mild, moderate or severe persistent asthma

Inpatient

Start Flovent or Advair at a dose based on age and/or severity of the patient’s asthma (addendum 3)

FLOVENT-
Common Canister
(multi-patient use)

ADVAIR-
Common Canister
(multi-patient use)

Discharge

Enter Discharge prescription for controller 24 hours before discharge

Relabel Albuterol inhaler with instructions for use after discharge. If albuterol to be rescheduled after discharge, be specific about dosing schedule and when to change to PRN (if applicable).

Note: If less than 100 puffs left in the albuterol inhaler, in addition to relabeling, enter a prescription for albuterol MDI.

HOW TO FIND INSURANCE INFORMATION IN COMPASS
1. Open patient’s electronic chart
2. Go to patient information band on left hand side
3. Choose face sheet tab
4. Scroll down for insurance information
# Addendum 3

## Inhaled Corticosteroids for Asthma

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Brand Name</th>
<th>Low Daily Dose (mcg) 0-4 yr</th>
<th>5-11 yr</th>
<th>≥ 12 yr</th>
<th>Medium Daily Dose (mcg) 0-4 yr</th>
<th>5-11 yr</th>
<th>≥ 12 yr</th>
<th>High Daily Dose (mcg) 0-4 yr</th>
<th>5-11 yr</th>
<th>≥ 12 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone HFA 40 or 80 mcg/puff</td>
<td>Qvar, Qvar RediHaler</td>
<td>N/A</td>
<td>40-80</td>
<td>80-240</td>
<td>N/A</td>
<td>160</td>
<td>240-480</td>
<td>N/A</td>
<td>320</td>
<td>&gt; 480</td>
</tr>
<tr>
<td>Budesonide DPI 90,180,200 mcg/inh</td>
<td>Pulmicort Flexhaler</td>
<td>N/A</td>
<td>100-200</td>
<td>200-400</td>
<td>N/A</td>
<td>200-400</td>
<td>400-800</td>
<td>N/A</td>
<td>&gt;400</td>
<td>&gt;800</td>
</tr>
<tr>
<td>Budesonide neb 0.25mg/2ml, 0.5mg/2ml</td>
<td>Pulmicort</td>
<td>0.5mg</td>
<td>0.25-0.5mg</td>
<td>N/A</td>
<td>0.5-1mg</td>
<td>0.5-1mg</td>
<td>N/A</td>
<td>&gt;1mg</td>
<td>2mg</td>
<td>N/A</td>
</tr>
<tr>
<td>Budesonide/Formoterol HFA: 80/4.5, 160/4.6</td>
<td>Symbicort</td>
<td>N/A</td>
<td>160</td>
<td>160</td>
<td>N/A</td>
<td>320</td>
<td>320</td>
<td>N/A</td>
<td>320</td>
<td>640</td>
</tr>
<tr>
<td>Ciclesonide HFA 80,160mcg/puff</td>
<td>Alvesco</td>
<td>N/A</td>
<td>80</td>
<td>80-160</td>
<td>N/A</td>
<td>160</td>
<td>160-320</td>
<td>N/A</td>
<td>320</td>
<td>320-640</td>
</tr>
<tr>
<td>Fluticasone HFA 44,110,220mcg/puff</td>
<td>Flovent</td>
<td>176 (mask)</td>
<td>88-176</td>
<td>88-220</td>
<td>176-440 (mask)</td>
<td>220-440</td>
<td>440</td>
<td>&gt;440 (mask)</td>
<td>880</td>
<td>880</td>
</tr>
<tr>
<td>Fluticasone/Salmeterol HFA: 45/21,115/21,230/21</td>
<td>Advair (mask)</td>
<td>180 (mask)</td>
<td>90-180</td>
<td>90-230</td>
<td>460 (mask)</td>
<td>230-460</td>
<td>460</td>
<td>920 (mask)</td>
<td>920</td>
<td>920</td>
</tr>
<tr>
<td>Fluticasone/Salmeterol Disk: 100/50,250/50,500/50</td>
<td>Advair</td>
<td>N/A</td>
<td>200</td>
<td>200</td>
<td>N/A</td>
<td>500</td>
<td>500</td>
<td>N/A</td>
<td>1000</td>
<td>1000</td>
</tr>
<tr>
<td>Mometasone DPI 110,220mcg/inh</td>
<td>Asmanex</td>
<td>N/A</td>
<td>110</td>
<td>110-200</td>
<td>N/A</td>
<td>220-440</td>
<td>220-440</td>
<td>N/A</td>
<td>&gt;440</td>
<td>&gt;440</td>
</tr>
<tr>
<td>Mometasone/Formoterol HFA: 100/5, 200/5</td>
<td>Dulera</td>
<td>N/A</td>
<td>N/A</td>
<td>200</td>
<td>N/A</td>
<td>N/A</td>
<td>400</td>
<td>N/A</td>
<td>N/A</td>
<td>800</td>
</tr>
<tr>
<td>Triamcinolone MDI: 100mcg/spray</td>
<td>Azmacort</td>
<td>N/A</td>
<td>400-800</td>
<td>400-1000</td>
<td>N/A</td>
<td>800-1200</td>
<td>1000-2000</td>
<td>N/A</td>
<td>&gt;1200</td>
<td>&gt;2000</td>
</tr>
</tbody>
</table>

N/A = Dosing not available in this age group, MDI = metered dose inhaler, HFA = hydrofluoroalkane inhaler, DPI = dry powder inhaler

For questions concerning this pathway, click here.

Last Updated December 28, 2018
Addendum 4
Asthma Discharge Checklist

Clinical Readiness for Discharge

☐ Albuterol- 8 puffs or 5 mg Q4 times 1 dose

☐ Oxygen Saturation >90 for more than 2 hours

Items Required for Discharge Home

☐ Asthma Action Plan

☐ Asthma Education

☐ Influenza Vaccine per hospital protocol if not already received for the year
(not applicable in ED- refer to primary provider)

☐ Order Albuterol MDI and re-label for home use with applicable home instructions
  • Relabel Albuterol inhaler with instructions for use after discharge. If albuterol to be rescheduled after discharge, be specific about dosing schedule and when to change to PRN (if applicable).
  • Note: If less than 100 puffs left in the albuterol inhaler, in addition to relabeling, enter a prescription for albuterol MDI.

☐ Prescription for Controller (addendum 2)

☐ Steroids: Dexamethasone script for dose #2- 0.6 mg/kg PO x1 (max: 16mg rounded to nearest 1 or 4mg tab) if second dose was not received in the hospital

Family education/ prescription instructions:
Give 24-36 hours after initial dose.
Crush and mix in a small bite of food or a teaspoon of liquid that the child prefers.

If the patient received methylprednisolone (Solumedrol) or prednisolone (Orapred), see addendum 1 for steroid management and write an applicable prescription to finish the course of treatment.

☐ Smoking Cessation, if indicated
Addendum 5:  
Pulmonary Unit (High Acuity Beds) Exclusion Criteria

The exclusion criterion to be applied to potential Pulmonary Unit (asthma high-acuity) admissions does not supersede clinician decision making. Should the clinician feel that the child’s placement would be better-suited in a higher level of care despite the presence of exclusion criteria; the clinician’s decision should be honored.

None of the below criteria should delay disposition per agreed time criteria between ED/PCRS/ICU.

- Level of Consciousness
  - If there is any question of altered mental status being present, the child is no longer appropriate for high-acuity unit placement.

- Blood Pressure
  - Common blood pressure side-effects from bronchodilators are increased systolic and decreased diastolic pressures. NS bolus should be considered once BP fall below normal range.
  - Should the child’s diastolic blood pressure fall below normal standards (not critical low value) without improvement after ONE NS bolus, the child is excluded.
  - Should the child report chest pain in the context of low diastolic blood pressure, then the child is excluded regardless of NS bolus administration.

- Pulmonary Insufficiency
  - Oxygen use alone is not a reason to exclude from admission.
  - After beta-agonist Rx has been applied and 15-20 minutes have passed to allow for equilibration of V/Q mismatch, if the child has new onset need for oxygen of greater than 50% FiO₂ then the patient is excluded.

Any patient in the acute care or Pulmonary Unit scoring of an 8 or more should be under the care of the PICU team.
Addendum 6:  
Dexamethasone (Oral) for the Treatment of Asthma

Administration Information

Children with asthma exacerbation and a Pediatric Asthma Score (PAS) of 3 or more will be given steroids within 1 hour of arriving in the emergency department. When possible, oral dexamethasone (Decadron) will be given at a dose of 0.6mg/kg (Max 16mg) x 1 dose.

If the patient cannot swallow tablets, the dexamethasone tabs can be crushed up and mixed with 3-5 ml of Syrpalta (grape syrup) or a bite of applesauce/pudding/ice cream.

For ease of dosing, consider rounding the dexamethasone to the nearest 4mg tab using these weight ranges:

- 8 to 10.9 kg = 6 mg
- 11 to 15.9 kg = 8 mg
- 16 to 23.9 kg = 12 mg
- 24 kg and above = 16 mg

Based on these ranges, the 4mg tab(s) can be used for all patients and crushed for those too young to swallow it.

One dose of dexamethasone (dosed as mentioned above) will provide anti-inflammatory treatment for 1-2 days. Most patients will not need another dose for at least 24 hours and patients with mild asthma exacerbation may not need another dose. Those with moderate exacerbation will need 2 doses separated by 24-36 hours. More than 2 doses of dexamethasone has not been studied for the treatment of asthma exacerbation.

Outpatient prescriptions for dexamethasone should be written using the 4 mg tabs and rounding to the nearest whole tab (using the weight ranges and doses above) x 1 dose po to be given 24 hrs following the ED or hospital time of administration. Pediatricians should write for a total of 2 doses to be given, separated by 24-36 hours with the first dose given as soon as possible. Additionally, there should be a sentence that states “crush tab(s) between two metal spoons and mix with 1 tsp of juice or 1 bite of food”. All outpatient pharmacies carry the 4 mg tabs.

Best Practice Points to Remember

- To meet the 1 hour metric for corticosteroids, it is best to have the 4 mg tabs loaded in your Omnicell.
- Tabs are the best dosage form for dexamethasone because the commercially available dexamethasone elixir is 30% alcohol and associated with a high rate of emesis.
- Parents should be counseled to give the second dose with food, in the morning, 24-36 hrs after the first dose (due to the common side effect of insomnia/hyperactivity).
Approved by the Pediatric Asthma Evidence-Based Outcomes Center Team

**Revision History**
Date Approved: June 11, 2014
Revision Date: March 20, 2019
Next Review Date: March 20, 2022

**Pediatric Asthma EBOC Team:**

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- Nilda Garcia, MD
- Meena Iyer, MD
- Michael Auth, DO
- Jorge Ganem, MD

**Recommendations**
Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible.

**Approval Process**
EBOC guidelines are reviewed by DCMC content experts, the EBOC committee, and are subject to a hospital wide review prior to implementation. Recommendations are reviewed and adjusted based on local expertise.

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Magnesium Sulfate

Beta-Agonist

Heliox

Ipratropium

Magnesium Sulfate
Magnesium Sulfate, continued


Noninvasive Positive Pressure Ventilation


Oxygen


Scoring Tool: Modified Qureshi PAS

Stereoids

- Bohannon K, Machen R, Ragsdale C, Padilla-Tolentino E, Cervenka P. Dexamethasone Associated with Significantly Shorter Length of Hospital Stay Compared to a Prednisolone Based Regimen in Pediatric Patients with Mild-Moderate Acute Asthma Exacerbations. Clinical Pediatrics 2019, accepted for publication.

Terbutaline