“Inpatient Asthma Care Pathway”

When ordered by a physician, an eligible child 1 year of age or older, admitted to the General Pediatric Inpatient Unit at the Children's Medical Center of the Medical College of Georgia with a primary diagnosis of Asthma will be managed according to a standard set of orders. This standard order set includes:

- O2/Oximetry Protocol
- Beta Agonist (Albuterol) Protocol for Asthma
- Ipratropium Bromide (Atrovent)
- Systemic steroids
- Inhaled steroids
- Peak Flow monitoring for patients 5 years and older
- Patient/Family Education
- Appointment for follow-up care with Primary Care Physician

The following will be utilized in the evaluation and management of patients:

I. Physician Orders:
   A. Patient admitted with primary diagnosis of Status Asthmaticus. All known secondary diagnosis, and/or co-morbid conditions should be documented as well.1
   B. Physicians will order Beta 2 Agonist Protocol using the Asthma Order Set.
   C. Physician will identify the patient’s classification of asthma upon admission.2
   D. Upon admission, all patients will be monitored and managed according to the O2/Oximeter protocol to keep saturations > 92%.
   E. All patients will be treated with systemic steroids, guidelines are listed on admission orders, if the physician orders a different dose a documentation on the orders should include the desired dose and the mg / Kg.4
   F. Home/maintenance steroids (preventative asthma med) will be continued on admission, and starting new inhaled steroids will be initiated when the beta agonist aerosols stretch to Q 3 hours.5
   G. When beta agonist aerosols stretch to Q3, peak flow monitoring will be initiated with the first treatment of the day, pre and post treatment TID, in those > 5 years of age who are capable.3
   H. Atrovent will be nebulized with the initial Albuterol treatment and with every other Albuterol treatment until the treatments stretch to Q 3 hours.

I. ANY RESPIRATORY THERAPY PROVIDED THAT IS NOT PART OF THIS PROTOCOL MUST HAVE A WRITTEN PHYSICIAN’S ORDER AND TAKES THE PATIENT OFF THE PROTOCOL.
II. Initial Assessment for Asthma Protocol:
A Respiratory Therapist (RT) will be notified of the order, review the patient’s chart for eligibility. **Inclusion criteria** includes any child ≥ 1 years of age with an admitting primary diagnosis of status asthmaticus. **Exclusion criteria** is any child < 1 years of age or any child without a diagnosis of acute asthma exacerbation. Also excluded are patients with chronic lung disease other than asthma. Patients ordered on Levalbuterol (Xopenex) will be given such medicines only with a physician order to use home supply (usually if this is the only B2 agonist that they use at home).

III. Initiation of Aerosol Therapy:
A. Upon admission, patients will be assessed, scored, and assigned a frequency they will receive a treatment at that time.
B. Therapy is initiated using the frequency and drug dosage according to the pre-treatment Asthma Score.7,8
C. All nebulized beta agonist aerosols will be delivered with 100% oxygen by mask or mouth piece unless patient has a condition that contraindicates this FiO₂.9,10
D. MDI therapy will be initiated during waking hours to patients who have successfully increased treatment intervals to Q3 hour therapy. Patients with a treatment frequency of Q 3 hour or longer treatment duration will be given all inhaled beta agonist therapy with an MDI and spacer.11 There may be patients who do not tolerate MDI therapy. In those cases, the RCP will document the problem and give the treatment using a nebulizer. Therapy can be continued under protocol. Consider ordering a nebulizer (compressor) for home and adding this to the education plan.
E. If the higher albuterol doses used in this pathway are not tolerated, the physician may choose to change to a lower dose and document the reasons.
F. Levalbuterol will be restricted to use with patients that have cardiac arrhythmias, unable to tolerate the effects of albuterol or those who routinely use Levalbuterol at home. It will be up to the physician to order Levalbuterol. Home supply may be used and they may continue to be on the pathway.

IV. Reassessment:
A. Patients are reassessed prior to each treatment and assigned an asthma score. Once the patient’s pre-treatment score has improved to the point that they meet the criteria for adjusting the dosing interval:13
   1) A treatment will not be given.
   2) The patient is re-scored and given a new frequency and/or medication dosage.
B. If the patient’s severity score is unchanged, the treatment is administered.
C. If the patient’s severity score is worse and requires a frequency change, a treatment is administered, the frequency is adjusted according to the score and the physician is notified.
D. Patients can only stretch to next frequency, regardless of score. Example: Q2 therapy may only stretch to Q 3hour therapy, not Q 4-6 hour.

V. PRN therapy:
A. A one - time PRN treatment will not alter the frequency schedule.
B. The next scheduled treatment is given according to the current assigned treatment schedule as if the PRN has never been administered.
C. The patient will not be eligible for an interval adjustment at this time.
D. The patient should not require a PRN treatment during the entire frequency duration in order to be eligible for an interval adjustment.
E. If the patient is being managed with Albuterol via MDI, the PRN treatment will also be administered with an MDI and spacer.

VI. Physician Notification:
A. The physician will be notified (paged) if any of the following occur: *(this notification will be documented in the patient’s medical record)¹⁴
   1. Any significant change in patient status. Special attention should be given to **change in sensorium** and if deteriorates immediate notification is required.
   2. An increase in treatment frequency.
   3. More than 1 PRN treatment is required before the next scheduled therapy.
   4. The patient has an oxygen requirement that increased.
5. Patient does not improve after 6 hours of therapy at Q2 hrs frequency. The RT is to provide the physician with the latest cardio/pulmonary assessment with this notification. This notification is required to update the physician about the patient’s status, and a consideration should be given to transfer the patient to the PICU.

6. Consult with MD if patient does not tolerate MDI therapy. Continue on nebulizer therapy and consider ordering a nebulizer for discharge.

B. When the patient’s frequency of therapy is decreased to q 3 hours. This is to alert the physician that we should consider discontinuing IV therapy, switching to PO steroids, and increasing our efforts to address any other barriers to discharge.

**This protocol does not require discharge at a specific point in the admission. There will be patients who warrant continued observation due to the severity of their asthma exacerbation, even though the intensity of their therapy has decreased to Q6 hours.

VII. Asthma Pathway Teaching Plan

1. An institutionally trained asthma educator will provide instruction and documentation of teaching to patients for asthma education. All teaching will be recorded in the medical record (on pathway flowsheet and the multidisciplinary patient teaching form). *Standardized teaching forms/materials will be used for continuity and distributed to patients/families as necessary.*

2. Teaching will begin on the first day and completed prior to discharge.

3. Education will be offered to all patients capable of providing their own therapy or the patient’s immediate caregiver (i.e. parent).

4. The physician will be notified in the event that teaching cannot be completed due to patient/family barriers to education.

5. Return demonstration should be used as a means to verify successful instruction.

6. Education will include the following as applicable:
   a) Basic overview of asthma as a disease process
   b) Ordered Medications
   c) Jet nebulizer and/or Metered dose inhaler
   d) Peak Flowmeter as applicable *including peak flow zones*

7. The Asthma Action Plan will be written by physician as part of the education plan

### Asthma Score\(^{15,16}\)

<table>
<thead>
<tr>
<th>Score</th>
<th>Respiratory Rate</th>
<th>Room Air Saturations*</th>
<th>Auscultation</th>
<th>Retractions**</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Normal Range (See age specific chart)</td>
<td>95-100%</td>
<td>No wheezing in all fields</td>
<td>No retractions noted</td>
</tr>
<tr>
<td>1</td>
<td>Increased by 30% (See age specific chart)</td>
<td>93-95%</td>
<td>End Expiratory Wheezing</td>
<td>Only one of the four noted</td>
</tr>
<tr>
<td>2</td>
<td>Increased by 65% (See age specific chart)</td>
<td>91-92%</td>
<td>Wheezing through entire expiration</td>
<td>Two of the four noted</td>
</tr>
<tr>
<td>3</td>
<td>Increased by 100% (See age specific chart)</td>
<td>&lt;91%</td>
<td>I&amp;E Wheezing or no audible air movement</td>
<td>Three or more noted</td>
</tr>
</tbody>
</table>

*A return to baseline O\(_2\) requirement for five minutes or until saturation drops below 91% (Room air saturations are for patients without pneumonia, without an O\(_2\) requirement at baseline, or significant (lobar) atelectasis on chest x-ray)

(RT should consider other conditions such as: obstructive sleep apnea, pneumonia, DKA, Sickle Cell, CHD, fever that may effect scoring)

** Retractions include: 1) intercostal, 2) subcostal, 3) suprasternal, and/or 4) nasal flaring
Age Specific Respiratory Rate Scale

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>*&lt;2 months old</td>
<td>&lt;60 bpm</td>
<td>&lt;80 bpm</td>
<td>&lt;100 bpm</td>
<td>&lt;120 bpm</td>
</tr>
<tr>
<td>*2-12 months old</td>
<td>&lt;50 bpm</td>
<td>&lt;65 bpm</td>
<td>&lt;85 bpm</td>
<td>&lt;100 bpm</td>
</tr>
<tr>
<td>1-5 years old</td>
<td>&lt;40 bpm</td>
<td>&lt;55 bpm</td>
<td>&lt;65 bpm</td>
<td>&lt;80 bpm</td>
</tr>
<tr>
<td>6-8 years old</td>
<td>&lt;30 bpm</td>
<td>&lt;40 bpm</td>
<td>&lt;50 bpm</td>
<td>&lt;60 bpm</td>
</tr>
<tr>
<td>9-14 years old</td>
<td>&lt;25 bpm</td>
<td>&lt;35 bpm</td>
<td>&lt;40 bpm</td>
<td>&lt;50 bpm</td>
</tr>
<tr>
<td>&gt;14 years old</td>
<td>&lt;20 bpm</td>
<td>&lt;25 bpm</td>
<td>&lt;35 bpm</td>
<td>&lt;40 bpm</td>
</tr>
</tbody>
</table>

* Protocol is for patients ≥ 1 year of age. These values are included for information only.

When assigning scores: If the breath sounds are ambiguous, consult with a more experienced respiratory therapist, or the physician. Always consider the entire patient and be sure the patient’s condition is determining the intensity of therapy.
Albuterol & Atrovent Doses

- **Q 2 hour therapy:**
  - Patients receiving therapy with a frequency of Q2h (Severity Score of <6, with no individual category score of 3).
  - Albuterol will be given via nebulizer.
  - Atrovent will be administered with every other treatment.

<table>
<thead>
<tr>
<th>Weight</th>
<th>Albuterol Dosage</th>
<th>Atrovent Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10 kg</td>
<td>2.5 mg/0.5 ml</td>
<td>250 mcg</td>
</tr>
<tr>
<td>10.1-20 kg</td>
<td>5 mg/1 ml</td>
<td>250 mcg</td>
</tr>
<tr>
<td>&gt;20 kg</td>
<td>5 mg/1 ml</td>
<td>500 mcg</td>
</tr>
</tbody>
</table>

- **Q 3 & Q 4 hour therapy:**
  - Patients receiving therapy with a frequency of Q3h (Severity Score of ≤4, with no individual category score of 3).
  - Patients receiving therapy with a frequency of Q4h (Severity Score of ≤3, with no individual category score of 3).

**Initiate MDI at Q 3 hour therapy:** notify the physician at this point with an update
- MDI therapy should be **initiated** in waking hours or when the parent/child are awake and able to understand and follow instructions.
- **All** Q 4 hour therapy will be delivered via MDI.

<table>
<thead>
<tr>
<th>Weight</th>
<th>MDI Dosage</th>
<th>Albuterol Dosage</th>
<th>Atrovent: Discontinued</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10 kg</td>
<td>4 puffs</td>
<td>2.5 mg/0.5 ml</td>
<td></td>
</tr>
<tr>
<td>10.1-20 kg</td>
<td>6 puffs</td>
<td>5 mg/1 ml</td>
<td></td>
</tr>
<tr>
<td>&gt;20 kg</td>
<td>8 puffs</td>
<td>5 mg/1 ml</td>
<td></td>
</tr>
</tbody>
</table>

- **Q 6 hour therapy for:**
  - Patient’s receiving therapy with a frequency of Q6h (Severity Score of ≤2, with no individual category score of >1)
  - Patients will be evaluated for discharge when they have successfully stretched their therapy to this level.

<table>
<thead>
<tr>
<th>Weight</th>
<th>MDI Dosage</th>
<th>Albuterol Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - 10 kg</td>
<td>2 puffs</td>
<td>1.25 mg/0.25 ml</td>
</tr>
<tr>
<td>10.1-20 kg</td>
<td>2 puffs</td>
<td>2.5 mg/0.5 ml</td>
</tr>
<tr>
<td>20.1-30 kg</td>
<td>4 puffs</td>
<td>2.5 mg/0.5 ml</td>
</tr>
<tr>
<td>&gt;30 kg</td>
<td>4 puffs</td>
<td>5 mg/1 ml</td>
</tr>
</tbody>
</table>

Levalbuterol is to be used as an exception for: those with cardiac arrhythmias, unable to tolerate effects of Albuterol, or for those patients who routinely use Levalbuterol at home. Dose and frequency will be ordered according to guidelines.
• Order Entry

1. Physician completes asthma order set that includes the order to “enter asthma protocol”.
2. As RT gives treatment, per pathway guidelines, according to score, RT will “Edit Dose” and document in Aerosol therapy the actual dose given, number of puffs for MDI or actual mg for jet nebulizer treatments.
3. The RT that assigns or changes treatment frequency will be responsible for entering / editing / discontinuing orders for aerosols, MDI, Peak Flows, and Pulse Ox monitors, into the asthma pathway flow sheet. The score obtained prior to the treatment will dictate the frequency for next treatment and will be recorded as “Next treatment frequency”.
4. Atrovent will be ordered every other treatment while Albuterol is being delivered via nebulizer and frequency is Q 2, then discontinued when the patient changes over to a frequency of Albuterol therapy at Q3.
5. Pharmacist will enter order for inhaled corticosteroid per the physician’s order. The therapist will not give until the patient’s treatment frequency stretches to frequency of Q 3.
6. MDI’s will be initiated when Q3 during the day/evening hours or as soon as the child and parent are awake and can understand and follow directions. All Q4 therapy will be via MDI.
7. RT will chart on Aerosol therapy sheet a full asthma severity assessment (RR, Breath Sounds, Retractions, Oxygen Saturation, and use of Oxygen) and document asthma score. This will provide reason for asthma score.
WHAT THESE PRACTICE GUIDELINES WILL DO
1. Scoring brings objectivity to the RT assessment of the patient admitted for asthma exacerbation.
2. Standardizes RT practices related to intensity of Albuterol therapy.
4. Standardizes Atrovent use.
5. Recommends key components of asthma medical management.
6. Provides clarity in physician notification requirements.
7. Ensures patients are competent with MDI and holding chamber prior to discharge.
9. Provides for early intervention by Social Work to establish PCP and meet discharge needs in a timely manner.

HOW TO KNOW THE TREATMENT STATUS OF THE PATIENT
1. Review the patient’s medical record by checking the Aerosol therapy flowsheet that will tell you the current frequency of treatments, O₂ given, asthma score and also how it was determined (RR, breath sounds and WOB).
2. Page the RT who is assigned to this patient and review the patient’s respiratory status and plan of care with him/her.

INITIAL MEASURES: Four Categories
2. Clinical outcomes.
3. Monitoring of RT practices in implementing the beta agonist protocol.

1. Utilization of Clinical Practice Guidelines: four populations
   a) Total number of eligible patients admitted to participating unit.
   b) Number of patients enrolled with no deseleting** on admission day 1.
   c) Number of patients enrolled with deseleting on admission day 1.
   d) Patients enrolled after admission day 1 (this includes patients transferred from PICU).
      **De-selecting means the asthma order sheet is used, but the defaulted ordered therapies are cancelled: for example: inhaled corticosteroids is crossed out and not ordered.

2. Clinical outcomes:
   a) Number of Albuterol treatments.
   b) Transfer to a higher level of care.
   c) Length of stay.
   d) Re-admission to IP or ER status within 30 days of discharge.

3. RT adherence to the Beta Agonist Protocol
   a) The assigned score matches the RT documented patient assessment.
   b) The documented asthma score matches the intensity of therapy according to the protocol.
   c) MDI therapy is initiated according to the protocol.
REPORTING ASTHMA MANAGEMENT OUTCOMES: Data will be collected by the Respiratory Care and reported to the Hospital QA Committee.

Key Contacts for these guidelines:
Physicians: Reda Bassali M.D.
Pharmacist:
Respiratory Care: Clifton Dennis, RRT
Protocol updated 6/8/2010
Available in house 7 X 24: Respiratory Therapist - pager: 5006
REFERENCES