

Fellow's Column: Use of a Clinical Respiratory Score to Improve Care of Pediatric Patients Hospitalized for Asthma

Luis Rivera, MD

Luis Rivera, MD, FAAP, is a Neonatology fellow at Loma Linda University Children's Hospital. He has a background working with underprivileged populations and is interested in global health as well as learning about health disparities in the neonatal intensive care unit.

Dr. Rivera is the editor of the new Fellowship column. Information on submission of material for the column follow below.

Fellow's Column is published monthly.

- Submission guidelines for "Fellow's Column":
- 1250 word limit not including references or title page.
- QI/QA work, case studies, or a poster from a scientific meeting may be submitted..
- Submission should be from a resident, fellow, or NNP in training.
- Topics may include Perinatology, Neonatology, and Younger Pediatric patients.
- No more than 7 references.
- Please send your submissions to:

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Background:

Asthma is one of the most common chronic illnesses of childhood, affecting an estimated 6 million children in the United States. Asthma has serious consequences on growth and development in children as well as serious economic and social burden for them and their families. The prevalence of asthma among the pediatric population is increasing and it is now the number one cause of pediatric hospitalizations in the United States, accounting for direct costs of 3.6 billion dollars per year.

During hospitalization, a child will be evaluated by different providers including nurses, physicians or respiratory therapists, each focusing on different aspects of the examination and assessing a patient differently. The use of a validated instrument, the Clinical Respiratory Score (CRS), and a clinical asthma pathway will allow for more objective assessments and create a more standardized approach to the management of these patients according to their acuity.

The assessment of respiratory status drives clinical decision making in children admitted for asthma, specifically when to

step-up therapy or wean medications, and when to discharge or escalate care.

"The prevalence of asthma among the pediatric population is increasing and it is now the number one cause of pediatric hospitalizations in the United States, accounting for direct costs of 3.6 billion dollars per year."

Study Aim:

To reduce length of stay (LOS) and number of albuterol doses by 10% in patients with asthma admitted to the pediatric inpatient unit by implementing a clinical pathway integrating the use of a clinical respiratory score.

Measures:

Process Measure:

- Proportion of monthly asthma patients with Inpatient Asthma Pathway used (verified by chart documentation of Clinical Respiratory Score).

Outcome Measure:

- Reduction in LOS
- Reduction in number of albuterol doses per pediatric asthma patient

Balance Measure:

- Percentage of ED revisits to SBH within 30 days of admission.

Methods:

Education: Pediatric residents participated in a training session on the use of a CRS-based asthma clinical pathway for the pediatric inpatient unit.

Data collection: Chart review of all patients with an ICD-10 discharge diagnosis of acute asthma exacerbation was performed. Average length of stay, average number of albuterol doses per patient, and SBH re-admits or ED re-visits within 30 days were obtained pre-intervention (N=9 patients, from Dec 2017) and compared with post-intervention (N=9 patients, from Dec 2017-Jan 2018).

Results:

- There was 100% compliance in documenting the use of the

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Clinical Respiratory Score

Variable	0 Points	1 Point	2 Points	3 Points
Respiratory Rate				
<2 months		≤60	61-69	≥70
2-12 months		≤50	51-59	≥60
13-23 months		≤40	41-44	≥45
2-3 year		≤34	35-39	≥40
4-5 year		≤30	31-35	≥36
6-12 year		≤26	27-30	≥31
>12 year		≤23	24-27	≥28
Retractions	None	Subcostal or intercostal	2 of the following: subcostal, intercostal, substernal OR nasal flaring (infant)	3 of the following: subcostal, intercostal, substernal, suprasternal, supraclavicular OR nasal flaring/head bobbing (infant)
Dyspnea				
0-23 months	Normal feeding, vocalizations and activity	1 of the following: dif culty feeding, decreased vocalization or agitated	2 of the following: difficulty feeding, decreased vocalization or agitated	Stops feeding, no vocalization, drowsy or confused
2-4 years	Normal feeding, vocalizations and play	1 of the following: decreased appetite, increased coughing after play, hyperactivity	2 of the following: decreased appetite, increased coughing after play, hyperactivity	Stops eating or drinking, stops playing, OR drowsy and confused
>4 years	Counts to ≥10 in one breath	Counts to 7-9 in one breath	Counts to 4-6 in one breath	Counts to ≤3 in one breath
Auscultation	Normal breathing, no wheezing present	End-expiratory wheeze only	Expiratory wheeze only (greater than end-expiratory wheeze)	Inspiratory and expiratory wheeze OR diminished breath sounds OR both

Minimum score: 1; Maximum score: 12

Clinical Asthma Pathway-Pediatric Emergency Department

*For patients over two years without preexisting conditions



INITIAL ASSESSMENT (1st HOUR)

RS 1

*Discharge with albuterol

**Signs of Clinical Decline

1. Drowsiness
2. Agitation
3. Confusion
4. Silent chest exam

RS 2-5

-Albuterol x1 Reassess after 20 to 60 minutes (Max:3 doses)
 **Steroids based on history & presentation
 -Consider ipratropium/albuterol if >1 Albuterol is needed

RS 6-12

-Albuterol + Ipratropium x3 back to back
 -Steroid therapy
 -Consider Magnesium Sulfate
 **With signs of clinical decline: ICU consult; consider BIPAP, epinephrine or terbutaline, prepare for intubation

Obtain Peak Flow on ALL patients ≥ 5 years old if feasible

REASSESSMENT (2nd Hour)

RS 1-4

*Discharge

*Discharge Planning

1. Albuterol every 4 hrs for 2 days, then every 4hrs as needed
2. Continue steroids for 3-5 days if started in the ED
3. Education use of spacer in patient 5 years and older
4. Asthma Action Plan
5. Appointment with PMD or subspecialty if indicated

RS 5-8

-Observe for 1hour
 -Consider Albuterol q1hour
 -Consider Magnesium sulfate (if not given)
 -If O2 sat <92% on 2LNC OR 40%FM: Mg sulfate, continuous albuterol , CXR and PICU consult

RS 9-12

-Continuous albuterol
 -Magnesium sulfate (if not given)
 -Consider BipAP, epinephrine or terbutaline, CXR, ICU consult
 -If undecided between Inpatient or ICU, proceed to 3rd hour

CHAM PICU ≤ 15 years old
 SBH ICU if > 15 years old (contact senior house)

Typical Medications:

Albuterol

<20 kg: 4 puff MDI or 2.5 mg nebulized
 ≥20 kg: 8 puff MDI or 5 mg nebulized

Continuous albuterol via nebulizer:

<20 kg: 10 mg/hr
 ≥20 kg: 15 mg/hr

Ipratropium bromide: 0.5mg every 20min up to 3 doses

Prednisone or Prednisolone (oral):

1st dose: 2 mg/kg/day (max dose 60 mg/day)
 Subsequently: 1-2 mg/kg/day

Dexamethasone: 0.3 mg/kg PO/IM (max 10 mg)

Methylprednisolone:

1st dose: 2 mg/kg (max- 60mg)
 Then: 1 mg/kg IV Q6h (max 125 mg/day)

**Consider systemic steroids if using albuterol q4 hours at home without clinical improvement or cough > 1 week

Indications for IV/IM steroids: Inability to tolerate PO or concern for inadequate (not adequate) GI absorption.

Adjunct Therapies:

Magnesium sulfate IV: 50-75 mg/kg (max dose 2 gms) over 20 minutes (Consider administration of Normal Saline bolus)

Epinephrine (1 mg/ml) 0.01mg/kg IM every 10-20min (max dose 0.3mg) **OR**

Terbutaline (1 mg/ml):

0.01 mg/kg SQ every 20min for total 3 doses (max dose 0.25mg)

Adapted from Children's Hospital of Montefiore, *Clinical Asthma Pathway*, with modifications based on expert local consensus

REASSESSMENT (3rd Hour)

RS 1-4

*Discharge

RS 5-8

-Admit to Inpatient if tolerating Albuterol q2 hours
-Consider adjunct therapies IF O2 sat <92% on 2LNC or 40%FM: Mg sulfate, continuous albuterol, CXR and PICU consult

RS 6-12

-Continuous albuterol
-Admit to ICU
***With signs of clinical decline or lack of improvement: consider BIPAP, epinephrine or terbutaline, prepare for intubation

***Discharge Planning**

1. Albuterol every 4 hrs for 2 days, then every 4hrs as needed
2. Continue steroids for 3-5 days if started in the PED
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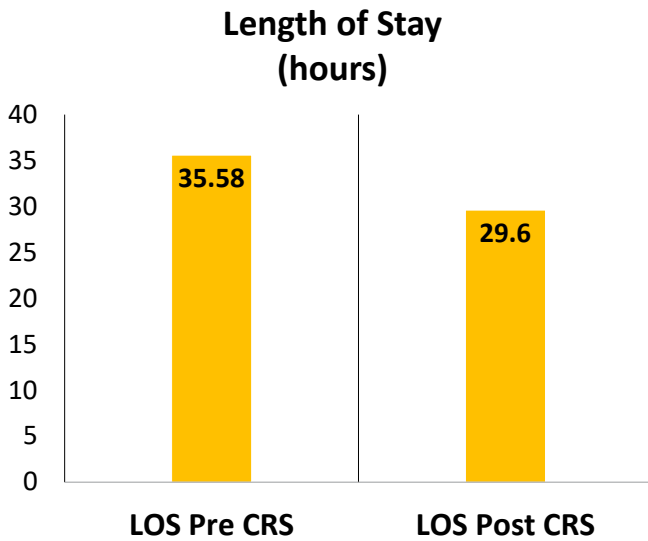
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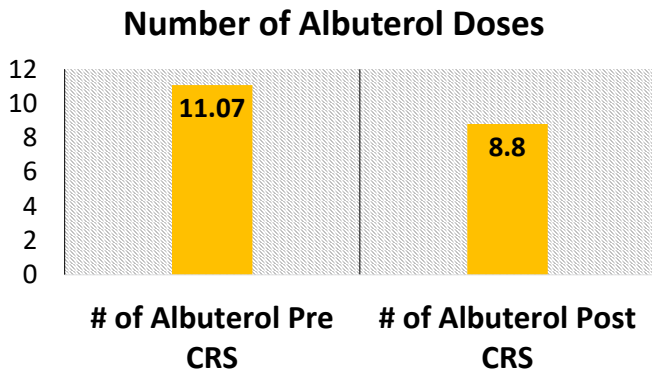
Terbutaline (1 mg/ml):

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Average Length of Stay Pre and Post Intervention



Average number of Albuterol Doses Pre and Post Intervention



- CRS in the post-intervention group.
- Both groups had equal number of return visits to the SBH Pediatric Emergency Department (11%)

CONCLUSIONS

- The implementation of CRS-based asthma clinical pathway successfully decreased the average LOS in hours and number of albuterol doses by more than 10%.

References:

1. *Guidelines for the Diagnosis and Management of Asthma. Oct 2007 National Heart Lung and Blood Institute National*

Asthma Education and Prevention Program Expert Panel Report

2. *Use of a Respiratory Score Among Different Providers. Pediatric Pulmonology 37:243 – 248 (2004)*
3. *Children's Hospital at Montefiore Clinical Asthma Pathway*

Disclosure: The author does not identify any relevant disclosures.

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