

Review of the Pediatric Asthma Score

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II. HOW TO USE

When to Use

The pediatric asthma score can be used in children aged 2-18 years with a history of a diagnosis of asthma presenting with an asthma exacerbation to guide next steps in inpatient medical management. The score can also be used to guide treatment in the emergency department setting. The PAS has not been validated in children with significant comorbidities (eg. sickle cell disease or cystic fibrosis) and should be used cautiously in those populations.

Pearls / Pitfalls

The PAS was derived from a cohort of patients who had already received oral or IV steroids within 30 minutes of treatment initiation. While the PAS can quantify the severity of an asthma exacerbation at a point in time, it cannot predict response to treatment, nor the need for inpatient admission.

The PAS may be more useful when used to track changes and compare serial reassessments in children as they receive asthma treatments. A single PAS may be less useful than a trend in scores over time.

The PAS has shown good inter-observer agreement among physicians, nurses, and respiratory therapists in an ED setting.

Remember to consider alternative diagnoses such as foreign body aspiration, anatomic anomalies (eg vascular rings/slings), or congestive heart failure, particularly in children who respond minimally to usual asthma care.

The PAS was derived from a clinical practice pathway developed at a single academic center for use in an inpatient setting and is not well validated in terms of out-

Abstract

The Pediatric Asthma Score can help standardize treatment of children 2-18 years presenting with asthma exacerbations. When used in conjunction with a treatment protocol, the PAS has been shown to reduce hospital length of stay as well as treatment costs. Initial PAS measured in the emergency department does not predict the need for hospital admission, and the decision to escalate care, or whether to admit to the ward or ICU, depends upon local admission criteria and individual patient factors.

comes such as mortality or likelihood of inpatient admission. The PAS continues to be used in research today to quantify asthma severity, but other scores exist and may be better validated (eg. the Pediatric Respiratory Assessment Measure aka “PRAM”).

Why to Use

When used as part of a standardized treatment protocol, the PAS has been shown to decrease length of stay, reduce costs, and improve quality of care.

The PAS can be helpful in patients unwilling or unable to perform peak expiratory flow measurements, or where peak flow measurement is not feasible (eg. resource limited settings or the emergency department). Peak flow measurements are also highly technique dependent, and comparison of peak flow measurements to prior scores is important for proper interpretation.

III. NEXT STEPS

Advice

Next treatment steps can be guided by the PAS score:

A PAS of 5-7 is considered “Mild” severity. One can consider de-escalation of current therapies, such as spacing of albuterol doses and interval assessments, or consideration of discharge.

A PAS of 8-11 is considered “Moderate” in severity. Continuation of current therapies is recommended. In the emergency department setting, consider including adjunctive therapies (magnesium, epinephrine).

A PAS of 12-15 represents a “Severe” presentation, and escalation of therapy is recommended. One may consider increasing the frequency of breathing treatments, addition of adjunct medications (ipratropium, terbutaline, magnesium, epinephrine), and/or transfer to an intensive care unit setting.

Management

The derivation study authors used a therapy-driven protocol derived from review of asthma practice patterns in the hospital, NHLBI (National Heart, Lung, and Blood Institute) guidelines, and a review of literature regarding inpatient management of status asthmaticus. The protocol was designed to use either the PAS or peak expiratory flow rate to measure response to treatment.

Critical Actions

Always assess airway, breathing, and circulation prior to calculating PAS. The PAS was not developed for use on unstable patients, and emergent intervention must not be withheld to determine the score.

Any patient being treated for asthma exacerbation should receive systemic steroids in addition to albuterol unless there is a contraindication.

Prior to discharge, every patient and their family should receive education on use of home inhalers and/or nebulizers, an asthma action plan, and scheduled follow-up with their primary care physician. Ensure the patient has adequate supply of home controller medications, peak flow meter, and spacer if applicable.

IV. EVIDENCE

Evidence Appraisal

The goal of the derivation study was to develop and “evaluate the effect of an inpatient asthma clinical pathway on cost and quality of care for children with asthma.” The PAS was based on previous practice methods at the institution (Children’s Hospital of The King’s Daughters, Norfolk, Virginia), NHLBI guidelines, and a search of the literature at the time. Outcomes and costs of treatment of asthmatic children before and after implementation of the PAS and associated treatment guidelines were examined using a retrospective cohort.

149 children were treated according to the clinical pathway from Sept to Dec 1997. Thirty-four were randomly selected and matched based on demographics (age, race, gender, admission, time of year, and comorbidities) to a retrospective cohort control group of asthmatic children treated prior to the implementation of the PAS and treatment protocol.

When comparing the two groups, they found:

- Length of stay was approximately 50% lower in the group that used the PAS and treatment pathway.
- Cost was on average \$1,200 lower in the group that used the PAS and pathway.
- Children in the PAS and pathway group were more likely to receive asthma education, prescriptions for controller medications, and equipment (spacers and peak flow meters) prior to discharge
- PAS patients were more likely to receive oral corticosteroids over IV corticosteroids.
- PAS patients were more likely to have close follow-up arranged at discharge than control patients.

While the results were profound and statistically significant, the sample size in this study was small. Additionally, although the control and cohort groups had similar demographics, they may not reflect the general population of pediatric asthmatics. For example, the two groups compared in the study were both 76% male, 97% African-American, and mostly between the ages of 2 and 15.

In a review article on severe acute asthma exacerbations, [Neivas and Anand](#) cite the PAS as a reliable means of assessing asthma severity in the ICU setting.

Another more recent study showed modest but acceptable (k = 0.57) interrater reliability of PAS calculation between pediatric ED nurses and trained study personnel (including pediatric emergency medicine fellows and attendings as well as a research nurse) (Gardiner & Wilkinson). In this study initial PAS did not predict need for hospital admission.

While the aforementioned studies have shown decent performance of the PAS when integrated into a clinical practice pathway, it is important to note that the score was derived now long ago (2000) in a small study and has not been validated insofar as patient outcomes such as mortality or need for readmission are concerned. Illness severity scores for children with asthma exacerbations are lacking in general, however the PAS remains a regularly utilized tool in current research around pediatric asthma care, particularly in published care pathways and quality improvement initiatives (e.g. Ozkaynak et al., J Asthma, 2023, and Willis et al., Respir Care, 2022).

Other validated asthma scores exist for use in children, including the Pediatric Respiratory Assessment Measure (PRAM, Ducharme et al., J Pediatr, 2008), which has had more extensive validation research performed (See Gray et al., Arch Dis Child, 2025).

Formula

	1 point	2 points	3 points
Respiratory Rate by Age			
2-3 years	≤34	35-39	≥40
4-5 years	≤30	31-35	≥36
6-12 years	≤26	27-30	≥31
>12 years	≤23	24-27	≥28

Oxygen Requirements	>95% on room air	90-95% on room air	<90% on room air or any supplemental oxygen
Auscultation	Normal breath sounds to end-expiratory wheeze only	Expiratory wheezing	Inspiratory and expiratory wheezing to diminished breath sounds
Retractions	None or intercostal	Intercostal and substernal	Intercostal, substernal, and supraclavicular
Dyspnea	Speaks in sentences (or coos and babbles)	Speaks partial sentences (or short cry)	Speaks in single words or short phrases (or grunts)

Facts & Figures

Interpretation:

Pediatric Asthma Score (PAS)	Severity of Exacerbation	Percent of Peak Flow (Personal Best or Predicted)
5-7	Mild	>70%
8-11	Moderate	50-70%
12-15	Severe	<50%

Literature

Original/Primary

<https://www.ncbi.nlm.nih.gov/pubmed/10831004>

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Validation

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