



<http://dx.doi.org/10.1016/j.jemermed.2017.03.021>

## Original Contributions

### INITIAL ASTHMA SEVERITY ASSESSMENT TOOLS AS PREDICTORS OF HOSPITALIZATION

Natalia Paniagua, MD,\* Amaia Elosegi, MD,\* Isabel Duo, MD,\* Ana Fernandez, MD,\* Elisa Mojica, PHD, MD,\* Lorea Martinez-Indart, MSC,† Santiago Mintegi, PHD, MD,\* and Javier Benito, PHD, MD\*

\*Pediatric Emergency Department, BioCruces Health Research Institute, Bilbao, Basque Country, Spain and †Epidemiology Unit, Cruces University Hospital, BioCruces Health Research Institute, Bilbao, Basque Country, Spain

Reprint Address: Javier Benito, PHD, MD, Pediatric Emergency Department, Department of Pediatrics, Cruces University Hospital, Plaza de Cruces s/n, E-48903 Barakaldo, Bizkaia, Spain

**Abstract—Background:** Assessment tools to classify and prioritize patients, such as systems of triage, and indicators of severity, such as clinical respiratory scores, are helpful in guiding the flow of asthmatic patients in the emergency department. **Objective:** Our aim was to assess the performance of the Pediatric Assessment Triangle (PAT), triage level (TL), Pulmonary Score (PS), and initial O<sub>2</sub> saturation (O<sub>2</sub> sat), in predicting hospitalization in pediatric acute asthma exacerbations. **Study Design:** Retrospective study evaluating PAT, TL, and PS at presentation, and initial O<sub>2</sub> sat of asthmatic children in the pediatric emergency department (PED). The primary outcome measure was the rate of hospitalization. Secondary outcomes were length of stay (LOS) in the PED and admission to the pediatric intensive care unit (PICU). **Results:** PAT, TL, PS, and initial O<sub>2</sub> sat were recorded in 14,953 asthmatic children. Multivariate analysis yielded the following results: Abnormal PAT and more severe TLs (I–II) were independent risk factors for hospitalization (odds ratio [OR] 1.6, 95% confidence interval [CI] 1.4–1.8; OR 3.4, 95% CI 2.6–4.3, respectively) and longer LOS (OR 1.5, 95% CI 1.3–1.7; OR 2.6, 95% CI 2–3.3, respectively). PS > 3 showed a strong association with hospitalization (OR 8.1, 95% CI 7–9.4), PICU admission (OR 9.6, 95% CI 3–30.9) and longer LOS (OR 6.2, 95% CI 5.6–6.9). O<sub>2</sub> sat < 94% was an independent predictor of admission (OR 5.2, 95% CI 4.6–5.9), PICU admission (OR 4.6, 95% CI 4.5–4.6), and longer LOS (OR 4.6, 95% CI 4.1–5.2). **Conclusions:** PAT, TL, PS, and initial O<sub>2</sub> sat are

good predictors of hospitalization in pediatric acute asthma exacerbations. © 2017 Elsevier Inc. All rights reserved.

**Keywords—**asthma exacerbation; pediatric assessment triangle; triage; pulmonary score; oxygen saturation; children

#### INTRODUCTION

Acute asthma exacerbations account for nearly 5% of children's visits to pediatric emergency departments (PEDs), and around 15% of patients may require admission to the PED's observation unit or to a hospital ward (1–6). The seasonal pattern in the presentation of asthma means that it may increase the risk of overcrowding in the PED and may compromise the quality of care provided and patient safety.

For this reason, assessment tools to classify and prioritize patients, such as systems of triage, and indicators of severity, such as clinical respiratory scores, are helpful in guiding the flow of patients and providing the best care in each situation.

The first contact with all patients attending the PED is at triage, where they are assigned a level of clinical priority. In recent years, several different triage scales have been proposed for the pediatric context. One of the most

widely used is the Pediatric Canadian Triage and Acuity Scale (PaedCTAS), whose validity has been assessed previously (7–9). This scale includes the Pediatric Assessment Triangle (PAT) as the first step to assess the physiological status of the patient (10,11). Previous studies have evaluated the predictive value of the PaedCTAS and the importance of PAT findings, in particular, as independent risk factors for overall hospitalization (8,9,12). Nevertheless, its usefulness and reliability remain unclear as predictors of hospitalization in children with acute asthma exacerbations.

After the triage process, patients undergo medical assessment. Determining the degree of airway obstruction to measure severity is difficult in the PED. Pulmonary function measures, such as spirometry and peak expiratory flow rate, are not often available and are difficult to perform in young children and for those of any age with a severe bronchospasm (13,14). Therefore, various respiratory scores have been used to estimate severity and monitor response to treatment. These scores include a combination of physical findings and vital signs. Some of them (Preschool Respiratory Assessment Measure, Pulmonary Index Score, and Pediatric Asthma Severity Score) have been validated, although some are difficult to apply (15–17). The Pulmonary Score (PS) is a “user-friendly” method to measure asthma exacerbation severity that has been validated in children older than 5 years of age and is increasingly widely used by PEDs in our area (16). This score is the aggregate of three items: respiratory rate (by age), wheezing, and accessory muscle use or retractions, each rated on a 0–3 scale (16). Although PS may be used to guide therapy and to evaluate the child response to treatment, relatively little is known about the role of this score in young children and those with severe bronchospasm, or its value as a predictor of admission. Moreover, current guidelines recommend monitoring oxygen saturation ( $O_2$  sat) during asthma exacerbation assessment but, to date, its value as predictor of admission has been a matter of discussion (1,18–25).

The purpose of this study was to assess the performance of the PAT, triage level (TL) given by PaedCTAS, a clinical score of asthma (PS), and  $O_2$  sat, as predictors of admission from a PED.

## METHODS

### *Study Design*

This was a retrospective cohort study evaluating the PAT findings and clinical scores of all children diagnosed with asthma in the PED of an acute-care teaching tertiary hospital near Bilbao, in the Basque Country, Spain. This department provides care to children under 14 years

old, with a mean of 60,000 emergency visits a year. Around 3,000 (5%) of these visits are due to asthma exacerbations.

We included all patients seen in the PED diagnosed with asthma exacerbation, from January 2007 to December 2012, with PAT, TL, PS, and initial  $O_2$  sat recorded. Patients with any missing data were excluded.

In our PED, each patient is classified by a trained nurse, using a five-level triage system based on the PaedCTAS. The first step is to assess the child’s physiological status with the PAT, followed by a brief interview with caregivers about the presenting complaint. Data of PAT and its components were registered in all patients as a mandatory part of the triage process. In the case of children with signs of increased work of breathing, the initial assessment is completed with vital signs ( $O_2$  sat, respiratory rate, heart rate, and neurologic status) as triage modifiers. Combining these items, each patient is assigned one of the following five TLs: I, Resuscitation; II, Emergent; III, Urgent; IV, Less Urgent; and V, Non-Urgent.

Once classified in the triage area, patients are seen by the physician in charge. The PAT is used again in order to determine whether the physiological situation has changed. If the patient is unstable, stabilization measures are instituted (some of them may have been initiated at triage, such as airway opening maneuvers and administration of oxygen). During the first medical assessment, the physician in charge (a pediatric resident under the supervision of pediatric emergency physicians) estimates the severity of the exacerbation with the PS; as indicated, this is a score between 0 and 9 obtained by combining physical findings namely respiratory rate stratified by age, wheezing, and accessory muscle use or retractions. Then, patients are classified into one of three levels: mild ( $PS \leq 3$ ), moderate ( $PS 4-6$ ), or severe ( $PS > 6$ ).  $O_2$  sat, measured in room air, is also recorded.

All children are treated using a standard asthma algorithm. Depending on asthma severity, children receive two to three  $\beta_2$ -agonist (albuterol) inhalations at 20-min intervals and subsequent doses are given as ordered by the physician in charge. Ipratropium bromide is added to two or three of the initial albuterol doses in moderate and severe exacerbations. Supplemental oxygen is administered to maintain  $O_2$  sat  $\geq 93\%$ . Oral corticosteroids are prescribed during the first hour of treatment. Other treatments as magnesium sulfate intravenously or high flow oxygen are administered in severe episodes when the initial treatment fails. Lack of response to treatment or persistent hypoxemia after initial treatment is criteria for hospitalization in the PED’s observation unit, which is a 24-h unit with 10 beds, or in the children’s ward. Criteria for admission to the pediatric intensive care unit (PICU) are  $PS > 6$  after initial treatment,  $O_2$

Download English Version:

<https://daneshyari.com/en/article/5653752>

Download Persian Version:

<https://daneshyari.com/article/5653752>

[Daneshyari.com](https://daneshyari.com)