RESULTS. Greater asthma exacerbation severity and number were associated with lower PAQLQ scores ($P < .001$), indicating poorer quality of life. PAQLQ was significantly lower in patients with more baseline triggers, and greater trigger number was associated with both severity and number of asthma exacerbations.

CONCLUSIONS. The number of baseline asthma triggers affects quality of life, exacerbation severity, and frequency of exacerbations in children aged 6 to 12 with severe or difficult-to-control asthma.

REVIEWER COMMENTS. Asthma is the most common childhood chronic disease in the United States, accounting for many missed school days and a significant social and economic burden for patients and families. The authors of this study emphasize the need to identify asthma triggers and to counsel patients on trigger avoidance as a way to reduce the number and severity of asthma exacerbations in children with severe and difficult-to-treat asthma. Addressing the psychosocial aspects of asthma via identification of baseline disease characteristics that negatively affect asthma-related quality of life can help lead to a patient-centered care approach.

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Fluid Balance Is Associated With Clinical Outcomes and Extravascular Lung Water in Children With Acute Asthma Exacerbation


PURPOSE OF THE STUDY. To investigate the effect of fluid overload on clinical outcomes in children hospitalized for an asthma exacerbation.

STUDY POPULATION. The retrospective cohort included children >6 years with only 1 admission to a single center for an asthma exacerbation during a 7-year period ($n = 1175$). Patients had to receive intravenous fluids within 24 hours of presentation and could not have chronic lung disease or acute pneumonia. From this same cohort, a quasitreatment group of children with multiple admissions, as defined by receiving $\geq 7\%$ peak fluid overload, was compared with a matched quasicontrol group who received $< 7\%$ ($n = 83$). A separate, prospective cohort included previously studied subjects who had a rhinovirus-triggered acute asthma exacerbation.

METHODS. Data on fluid intake and output were retrospectively collected from the electronic medical records for the first 72 hours of hospitalization or until discharge. The highest percentage of cumulative fluid overload within the first 72 hours was considered the peak fluid overload. Time to weaning $\beta$-agonist therapy to every 2 hours and duration of supplemental oxygen requirement were assessed. In the prospective cohort, ultrasound images of the lung and heart were obtained, and changes in the peak aortic velocity, as a surrogate for lower-airway obstruction, were measured.

RESULTS. In the retrospective part of the study, a $1\%$ increase in fluid overload was on average associated with an $\sim 7$-hour increase in hospital length of stay, an $\sim 6$-hour increase in the duration of $\beta$-agonist treatment, and an $\sim 2$-hour increase in the duration of oxygen supplementation. A peak fluid overload cutoff of $\geq 7\%$ was specifically identified as being associated with increased oxygen use and need for noninvasive positive pressure ventilation. Similar statistically significant associations were observed in the matched retrospective cohort and the prospective observational cohort. In the prospective cohort, a larger variation in peak aortic velocity correlated with more negative inspiratory intrapleural pressures. The combination of the peak fluid overload cutoff at $\geq 7\%$ and the high variation in peak aortic velocity was proposed as the physiologic mechanism for increased extravascular lung water and the aforementioned outcomes.

CONCLUSIONS. The combination of fluid overload and larger variation in peak aortic velocity, resulting in more lung water, provides a physiologic explanation for and is associated with worse clinical outcomes in children who are hospitalized with an acute asthma exacerbation.

REVIEWER COMMENTS. Understanding the factors that contribute to the clinical outcomes of hospitalizations for acute asthma is important toward making optimal management decisions. Fluid management is a common challenge in critical care but is often not considered a major player in acute asthma outcomes in pediatric patients. In this study, the authors raise the issue that perhaps more attention should be given to fluid administration and the fluid status in hospitalized children with severe asthma exacerbations.

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Positive Expiratory Pressure for the Treatment of Acute Asthma Exacerbations: A Randomized Controlled Trial


PURPOSE OF THE STUDY. To evaluate the effectiveness of positive expiratory pressure (PEP) in children presenting to the emergency department (ED) with moderate-to-severe asthma exacerbations.
STUDY POPULATION. The study included children, 2 to 18 years old, who presented to a tertiary-care children’s hospital ED for an acute asthma exacerbation.

METHODS. This was a single-blinded, randomized study during which subjects were randomly assigned to receive either PEP or observation after first-line treatment with nebulized ipratropium bromide, albuterol, and systemic steroids. Within 15 minutes of first-line treatment completion, the intervention group received PEP therapy. A pulmonary asthma score was assessed for all subjects at randomization and 15 minutes after intervention or observation.

RESULTS. Fifty-two subjects were enrolled, with 26 subjects in each group. There were no significant differences in regard to age, sex, race, asthma severity, or ED course characteristics. No significant difference was found between groups in regard to change in pulmonary asthma score or need for additional second-line therapies, ED length of stay, admission rates, or ED return within 72 hours.

CONCLUSIONS. PEP therapy was safe and feasible to perform, but there was no significant difference compared with children in the control group in all outcomes measured, suggesting that PEP does not confer benefit in moderate-to-severe asthma exacerbations.

REVIEWER COMMENTS. Both PEP and noninvasive positive-pressure ventilation have been investigated as alternative second-line therapies for asthma exacerbations. Neither treatment has been shown to confer significant clinical benefit in controlled studies. Additional work is needed to identify effective therapies for asthma exacerbations that do not respond to initial management.

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Does Nebulized Hypertonic Saline Shorten Hospitalization in Young Children With Acute Viral Wheezing?

PURPOSE OF THE STUDY. To determine the efficacy of nebulized hypertonic saline (HS) in children hospitalized for acute viral wheezing.

STUDY POPULATION. This study included Thai children aged 6 months to 5 years who were admitted to a pediatric inpatient ward for an episode of acute viral wheezing during a 6-month period. Children could have a history of previous wheeze but were excluded if there was a history of congenital cardiac disease, chronic lung disease, physician-diagnosed asthma, or current steroid use.

METHODS. In this double-blinded, randomized controlled trial, children received 2.5 mg of nebulized salbutamol in 3% HS (n = 22) or in normal saline (NS) (n = 25) every 4 to 6 hours as needed until discharge. Clinical history, laboratory data including a viral antigen nasopharyngeal swab, chest radiograph, and asthma clinical severity scores were assessed. Discharge was defined as an asthma clinical severity score <6 twice consecutively.

RESULTS. Samples for viral antigen were taken from 40 children (85.1%) with 30% positive for a respiratory virus. Patients treated with HS had a shorter median length of stay than patients treated with NS (48 hours versus 72 hours, respectively, P = .021), particularly in the 6-to-15-month-old group. The median number of hours of oxygen therapy was also significantly shorter in the HS group (36 hours) than the NS group (72 hours) (P = .025). Patients in the HS group had statistically significant improved asthma clinical severity scores, decreased respiratory rate, and improved oxygen saturation at 12 hours. Although the HS group received fewer doses than the NS group, the difference was not significant. There were no increased adverse events to HS in comparison with NS.

CONCLUSIONS. HS is an effective treatment of patients <5 years of age who are hospitalized with acute viral wheeze.

REVIEWER COMMENTS. Nebulized HS has been shown to improve airway clearance and thus have a clinical benefit in conditions like asthma and cystic fibrosis, but clinical trial results of HS for bronchiolitis are conflicting. In this study, the authors suggest that HS may benefit hospitalized children, particularly younger children, with viral-induced wheeze. However, 1 of the study limitations is that children with bronchiolitis and asthma were also likely included in the analyses given the age range. It remains to be seen whether HS actually provides clinically significant benefits for viral-induced wheezing, bronchiolitis, and/or asthma because further studies in more homogeneous subgroups with larger sample sizes are needed.

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Does Asthma Affect School Performance in Adolescents? Results From the Swedish Population-Based Birth Cohort BAMSE

PURPOSE OF THE STUDY. To examine whether asthma affects school performance in adolescents.
Positive Expiratory Pressure for the Treatment of Acute Asthma Exacerbations: A Randomized Controlled Trial
Katherine J. Caid and Robert D. Pesek
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