

# Comparison of Respiratory Status at 3 Hours vs. 4 Hours After Bronchodilator Therapy in Hospitalized Pediatric Asthmatics

Vincent Patrick Uy, MD<sup>1</sup>, Daniel Erichsen, MD<sup>2</sup>, Alyson Smith, MD<sup>1</sup>, Paulo Pina, MD, MPH<sup>1</sup>, David Rubin, MD<sup>1</sup>

<sup>1</sup>SBH Health System, Bronx, NY

<sup>2</sup>PeaceHealth Sacred Heart Medical Center, Eugene, OR

Please address all correspondence to Dr. Vincent Patrick Uy, SBH Health System, 4422 Third Ave, Bronx NY, 10457, Email: [vuy@sbhny.org](mailto:vuy@sbhny.org)

Keywords - pediatric asthma, bronchodilation, spacing

## ABSTRACT

Our objective is to compare vital signs and respiratory physical examination findings 3 hours and 4 hours after bronchodilator therapy. Vital signs and respiratory examination did not differ 3 hours versus 4 hours after two consecutive doses. These data suggest that earlier hospital discharge may be possible in this pediatric population.

## INTRODUCTION AND OBJECTIVES

Asthma exacerbations remain a common reason for hospital admission in the pediatric age group. Inpatient therapy requires interval bronchodilator treatments while awaiting the inflammatory reaction to subside. Resolution of symptoms while receiving bronchodilator therapy every 4 hours (Q4) is a commonly used criterion for discharge. In a prior study by Stormon, MO, et al., discharge while receiving bronchodilator therapy every 3 hours (Q3) was determined to be safe and effective (1). However, earlier discharge has not been studied in a US population and current National Heart, Lung and Blood Institute guidelines do not recommend either Q3 or Q4 therapy as criteria for hospital discharge.

Our objective was to compare vital signs and respiratory physical examination findings 3 hours and 4 hours after Q4 bronchodilator therapy. Our hypothesis was that no difference between vital signs and respiratory physical examination between Q3 and Q4 therapy would be found. The absence of deterioration from the 3 to 4 hour mark would support Stormon and colleagues finding that earlier discharge may be therapeutically equivalent.

## METHODOLOGY

This was an 18-month prospective study among pediatric patients 2-20 years old who were admitted from January 2012 - January 2013 to an urban community hospital. Eligible subjects were patients with a diagnosis of asthma exacerbation and/or status asthmatics who were admitted directly to the pediatric floor or transferred from the intensive care unit. All these subjects were tolerating bronchodilator therapy every 2 hours and had received, at least, a dose of corticosteroids prior to admission. We excluded subjects whose charts had incomplete data. We estimated a sample size of 80 subjects ( $\alpha=0.05$ ).

Heart rate, respiratory rate, oxygen saturation and respiratory physical examination parameters (including presence of wheezing, chest wall retractions and air entry) were obtained and documented by house staff four times for each patient. The first data set was gathered 3 hours after bronchodilator therapy at the time the patient was transitioned from

Q3 to Q4 treatments. The second data set before the first Q4 dose. The third data set 3 hours after the first Q4 dose and the fourth and final data set before the second Q4 does. Additional information gathered included the NHLBI Asthma classification, demographic information and BMI percentile.

SPSS v22.0 was used for data analysis. We used a student T-test to evaluate continuous data and Chi-square analysis for categorical data. Secondary analysis with gender, age, race, BMI and asthma severity was performed using a logistic regression model.

## RESULTS

The mean age of the population sampled was 7 years old with a standard deviation of 5.31 years. Most of the subjects were classified as intermittent asthmatics at the time of their admission and majority of our subjects were males. (Table 1).

Table 1: Patient Demographics	
Total Number of Patients	N=77
Age (Mean± SD)	7.06 ± 5.31
Gender	
Males (N, %)	46 (59.7%)
Females (N, %)	31 (40.3%)
Race	
Hispanic (N, %)	40 (51.9%)
Non-Hispanic (N, %)	37 (48.1%)
BMI	
BMI <5th percentile (N, %)	16 (20.8%)
BMI 5th-85th percentile (N, %)	40 (51.9%)
BMI >85th percentile (N, %)	21 (27.3%)
Asthma Classification	
Intermittent Asthma (%)	36.4%
Mild Persistent Asthma (%)	27.3 %
Moderate Persistent Asthma (%)	29.9 %
Severe Persistent Asthma (%)	6.5%

On primary analysis, vital signs and respiratory examination did not differ 3 hours versus 4 hours after two consecutive Q4 doses of bronchodilators in hospitalized asthmatic children (Table 2). Secondary analysis with gender, age, race, BMI and asthma severity also did not demonstrate any difference.

Parameters	1st 3 h exam	1st 4 h exam	p-value	2nd 3 h exam	2nd 4 h exam	p-value
Heart Rate	115.7 ± 19.4	116.1 ± 18.1	0.750	115.4 ± 17.4	115.1 ± 16.4	0.847
Respiratory Rate	26.3 ± 7.2	26.1 ± 6.9	0.797	25.9 ± 6.4	26.1 ± 6.6	0.632
Oxygen Saturation	97.0 ± 1.9	96.9 ± 2.2	0.769	96.8 ± 2.3	97.2 ± 2.2	0.164
Wheezing	28 (36.4%)	29 (37.7%)	1.000	23 (29.9%)	26 (33.8%)	1.000
Retractions	10 (13%)	9 (11.7%)	1.000	6 (7.8%)	4 (5.2%)	0.746
Decreased Air Entry	1 (1.3%)	3 (3.9%)	0.625	2 (5.2%)	2 (2.6%)	0.681

## DISCUSSION AND CONCLUSIONS

There was no difference in vital signs and respiratory exam 3 and 4 hours prior to 2 consecutive Q4 bronchodilator treatments. The absence of deterioration in these parameters suggests that clinical stabilization occurred at the time of transitioning to Q4 hourly doses of bronchodilator therapy. This indicated that earlier discharge than is the norm may be safe in children admitted for asthma exacerbations. Potential benefits with early discharge include decreased nosocomial infections, decreased cost and improved patient satisfaction. A larger randomized study should be performed to confirm these preliminary results.

## REFERENCES

- 1. Stormon MO, Mellis CM, van Asperen PP, Kilham HA.** Outcome evaluation of early discharge of asthmatic children from hospital: a randomized control trial. *J Qual Clin Practice* 1999;19:149–154
- 2. British Thoracic Society Scottish Intercollegiate Guidelines Network.** British guidelines on the management of asthma: a national clinical guideline. Revised edition November 2005. London: British Thoracic Society.
- 3. Henry RL.** Outcome evaluation of early discharge after hospitalization for asthma. *Current Opinion in Allergy Clinical Immunology* 2006;6:172–174.
- 4. National Heart, Lung & Blood Institute, National Asthma Education and Prevention Program, Expert panel report 3: Guidelines for the Diagnosis and Management of Asthma, Full Report 2007**