Predicting Admission of Children Presenting to the Emergency Department with Acute Asthma

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Introduction

Acute asthma is one of the top causes of children's admission to the hospital. In Saudi Arabia, an average of 5.7% of all ED visits were secondary to asthma.

We aimed to evaluate the seasonal variation of acute asthma presentation in children and the utility of components of the pediatrics asthma score (PAS) (Table1) for early admission prediction.

Table1. Pediatrics Asthma Score

Variable	Asthma score		
	1 point	2 points	3 points
Respiratory rate (breaths/min)			
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 saturation (%)	> 95 with room air	90 - 95 with room air	<90 with room air or supplemental oxygen
Auscultation	Normal breathing or end-expiratory wheezing	Expiratory wheezing	Inspiratory and expiratory wheezing, diminished breath sounds, or both
Retractions	None or intercostal	Intercostal and substernal	Intercostal, substernal, and supraclavicular
Dyspnea	Speaks in sentences or coos and babbles	Speaks in partial sentences or utters short cries	Speaks in single words or short phrases or grunts

Methods

As part of a randomized controlled trial addressing the clinical efficacy of Budesonide nebulization in the treatment of acute asthma in children the PAS was measured at baseline, 1st, 2nd, 3rd, and 4th hour from the start of medications. Decision of admission was taken at or beyond the 2nd hour.

Results

Out of a total 906 emergency department (ED) visits with acute asthma, 157 children were admitted. June to September witnessed the lowest number of visits. The admission to discharge ratio varied throughout the year (Figure1) . During the ED stay, between baseline and 2nd hour, admission predictability of the total score was best at the 2nd hour, followed by the 1st hour and then baseline (Figure2) . The total score remained the strongest predictor of admission at every time point compared to its individual components. Patients with total score ≥11/15 could be admitted at the 2nd hour with 99% specificity. Oxygen saturation and respiratory rate had relatively higher predictability than other components.

Figure1. Frequency chart showing the distribution of admitted and discharged children with acute asthma and their ratio form the emergency department over one year
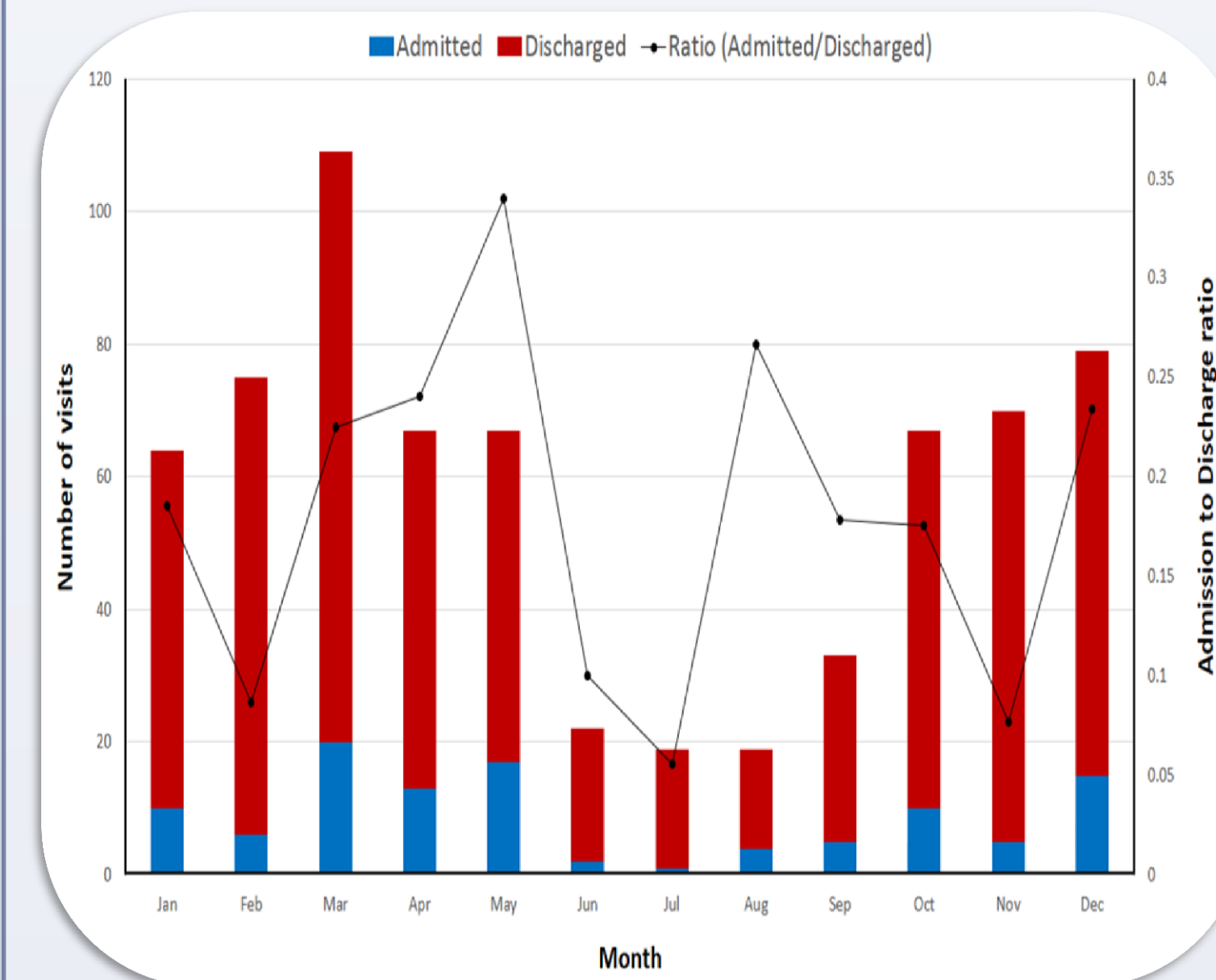

Figure2. Receiver Operating Characteristic (ROC) curves of the acute asthma scores at (a) baseline, (b) 1st hour, (c) 2nd hour, and (d) the difference in score between the 2nd hour and baseline

Conclusion

Decision of admission can reliably be made to a large proportion of children with acute asthma at the 2nd hour of ED stay based on their total asthma score. Oxygen saturation and respiratory rate should be part of any scoring system to evaluate acute asthma in children.

Full Article

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