Compliance of Corticosteroid and Albuterol Treatment in the Emergency Department

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Background

- Asthma is a significant health issue for children, with more than 700,000 pediatric patients visiting emergency departments each year
- The 2024 Global Initiative for Asthma guidelines along with the 2020 National Heart, Lung, and Blood Institute guidelines recommend the use of rapid acting inhaled bronchodilators, systemic corticosteroids, and controlled oxygen supplementation for acute asthma exacerbations.
- Quality improvement projects aimed at standardizing asthma severity scoring and the improvement of timely administration of albuterol through order sets have been associated with reduced emergency department (ED) length of stays (LOS) and admission rates.

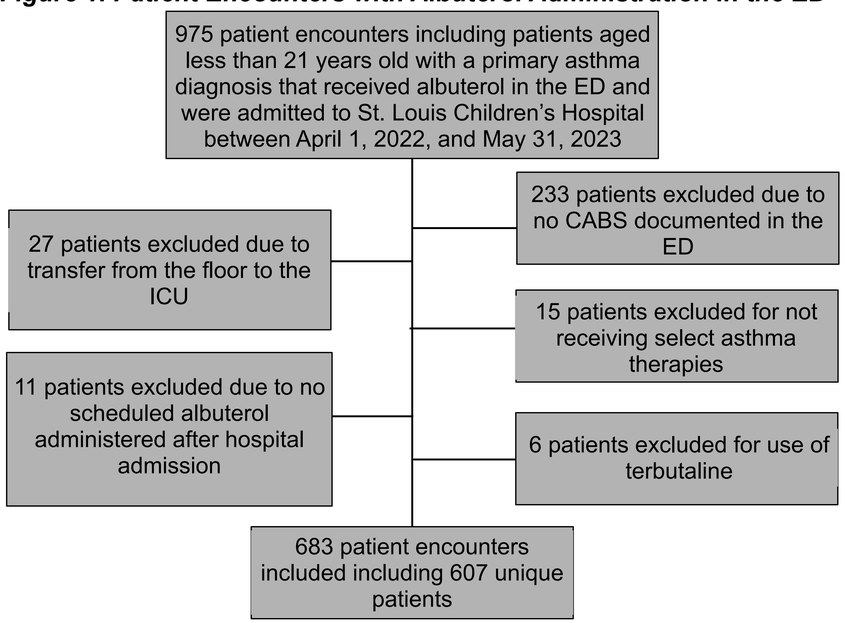
Objectives

This study is evaluating the ED's choice of systemic corticosteroids, frequency of adjunctive medications administered, corticosteroid and albuterol dose compliance, and order set usage/compliance.

Methods

The Institutional Review Board at Southern Illinois University Edwardsville approved this retrospective study.

Figure 1. Patient Encounters with Albuterol Administration in the ED



ICU, Intensive Care Unit: CABS, Children's Asthma/Bronchiolitis Scores

Results

Table 1. Patient Demographics

Characteristic	N=607
Male sex, n (%)	359 (59.1)
Race, n (%)*	
Black	407 (67.1)
White	199 (32.8)
Other	5 (0.8)
Unknown	1 (0.2)
Median age, years (IQR)	4 (2-7)
Median weight, kg (IQR)	18 (14.1-30.9)

*Patients could be included in ≥ 1 category
IQR, Interquartile Range

Table 2. Patient Encounter Characteristics

Characteristic	N=683
Chief Complaint, n (%)*	
Respiratory Distress	386 (56.5)
Asthma Exacerbation	183 (26.8)
Cough	63 (9.2)
Shortness of Breath	37 (5.4)
Other	71 (8.6)
Median ED LOS, hours (IQR)	5.3 (5-7)
Patient Disposition	
Floor	465 (68.1)
ICU	218 (31.9)
Median ICU LOS, days (IQR)	1.4 (1-2)
Median Hospital LOS, days (IQR)	1.8 (1-3)

*Patients could be included in ≥ 1 category
ED, Emergency Department; ICU, Intensive Care Unit; IQR, Interquartile Range; LOS, Length of Stay

Table 3. Patient Disposition Comparison

Characteristic in the ED, n (%)	Floor (n=465)	ICU (n=218)	P-value
Exacerbation severity			**<0.0001**
Mild (CABS ≤ 3)	154 (33.1)	28 (12.8)	**<0.0001**
Moderate (CABS 4-6)	235 (50.5)	116 (53.2)	0.515
Severe (CABS ≥ 7)	76 (16.3)	74 (33.9)	**<0.0001**
Corticosteroid administered	395 (85)	181 (83)	0.52
Dexamethasone*	233 (59.0)	63 (34.8)	**<0.0001**
Prednisolone/Prednisone*	134 (33.9)	63 (34.8)	0.836
Methylprednisolone*	28 (7.1)	57 (30.4)	**<0.0001**
Albuterol/ipratropium	452 (97.2)	202 (92.7)	**0.006**
1-hour continuous albuterol	133 (28.6)	172 (78.9)	**<0.0001**
Intermittent albuterol	152 (32.7)	61 (28)	0.216
Magnesium	135 (29)	165 (75.7)	**<0.0001**
Epinephrine IM	4 (0.9)	27 (12.4)	**<0.0001**

*Relative to patient encounters with corticosteroid administration
CABs, Children's Asthma/Bronchiolitis Scores; ED, Emergency Department; IM, Intramuscular

Table 4. Patient Disposition and Medication Guideline Compliance

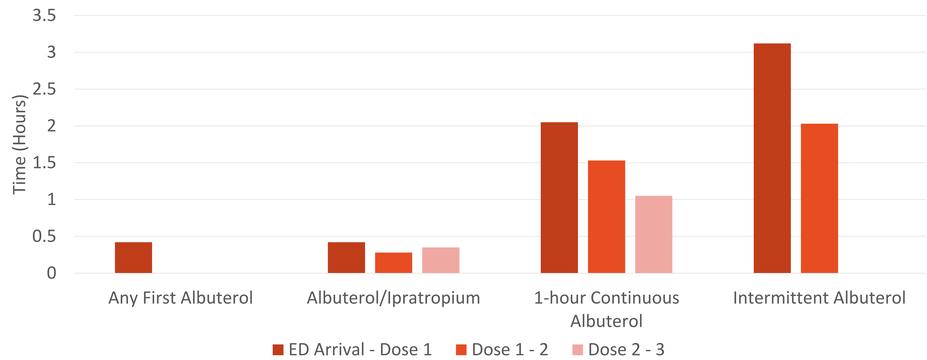
Characteristic, n (%)	Floor (n=465)	ICU (n=218)	P-value
Corticosteroid compliance*			
Selection based on CABS	345 (87.3)	126 (69.6)	**<0.0001**
First dose compliance (mg/kg)	374 (94.7)	160 (88.4)	**0.007**
Albuterol dose compliance**			
Albuterol/ipratropium	375 (83)	157 (77.7)	0.112
1-hour continuous albuterol	120 (90.2)	163 (94.8)	0.128

*Relative to patient encounters with corticosteroid administration
**Relative to patient encounters with specified albuterol administration
CABS, Children's Asthma/Bronchiolitis Scores

Table 5. Characteristics Associated with Albuterol Dose Non-compliance

Characteristic, n (%)	All albuterol doses compliant (n=535)	Any non-compliant albuterol (n=133)	P-value
Any albuterol override	173 (32.2)	61 (45.9)	**0.001**
Any albuterol ordered outside of an order set	205 (38.3)	70 (52.6)	**0.011**

Figure 2. Median Time Between Select Asthma Therapies in the Emergency Department



Conclusion

- Methylprednisolone was administered more often in patient encounters resulting in ICU admission. Dexamethasone was more commonly administered in patient encounters resulting in floor admission; however, it was the first corticosteroid administered in one-third of patients encounters resulting in ICU admission.
- Corticosteroid selection and dose were more likely to be compliant in patient encounters resulting in floor vs ICU admission, which may have resulted from provider comfortability with dexamethasone over methylprednisolone.
- Patient encounters with any albuterol override or order source outside of an order set were more likely to be non-compliant with the asthma guidelines.
- Education on avoiding dexamethasone in severe exacerbations, optimizing methylprednisolone dosing, opportunities to improve CABS documentation, and increased order set utilization are needed to improve guideline compliance.

All authors: Nothing to disclose