

Variations in Management of Acute Pediatric Respiratory Emergencies Within a Single Health System

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Introduction

Acute respiratory emergencies are among the highest reasons for pediatric emergency department (ED) visits. Of these are conditions affecting the airways due to inflammation or hyperresponsiveness, such as croup, asthma, and associated respiratory conditions. Diagnosis in younger pediatric patients can be difficult due to overlapping clinical presentations.

Many academic institutions have clinical pathways and guidelines based on standardized assessment scores specific to these conditions. However, only 15% of United States children's hospitals' clinical practice guidelines recommend using standardized croup scores, and geographic variations exist in the recommendation of using clinical asthma scores.

Other scores such as the Clinical Respiratory Score (CRS) have been studied to predict severity of respiratory distress and likelihood of critical care admissions but were used to guide clinical management.

There may be practice variability among ED providers within a single health system depending on site of ED or specialty of provider within each site, despite having access to those guidelines.

This study analyzes variations in management between ED sites and provider training to help guide quality improvement plans and optimize management.

Methods

- We conducted a retrospective chart review of deidentified patients aged five years and younger who presented with respiratory complaints to EDs within a single health system from November 2022 - July 2025.
- Descriptive statistics were used for demographic data
- Inferential statistics, including odds ratios, correlation analyses, and MANOVA with logistic regression, were used to assess variability among ED sites (academic, satellite, and community) and specialty of the provider.
- Statistical significance will be defined as $p < .05$.

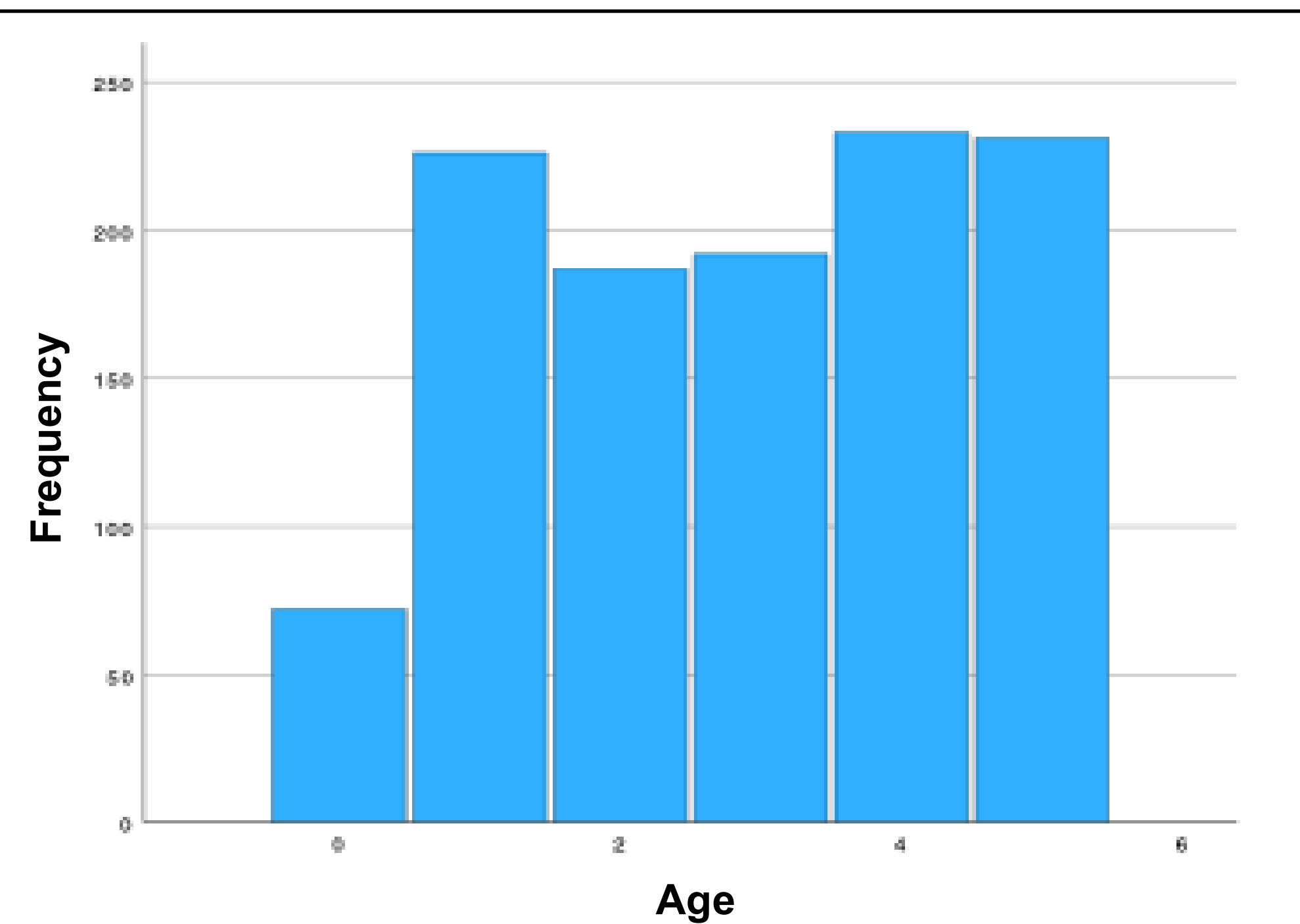


Figure 1. Age distribution of qualifying charts. N=1141, $\mu=2.86$ years, $\sigma=1.588$

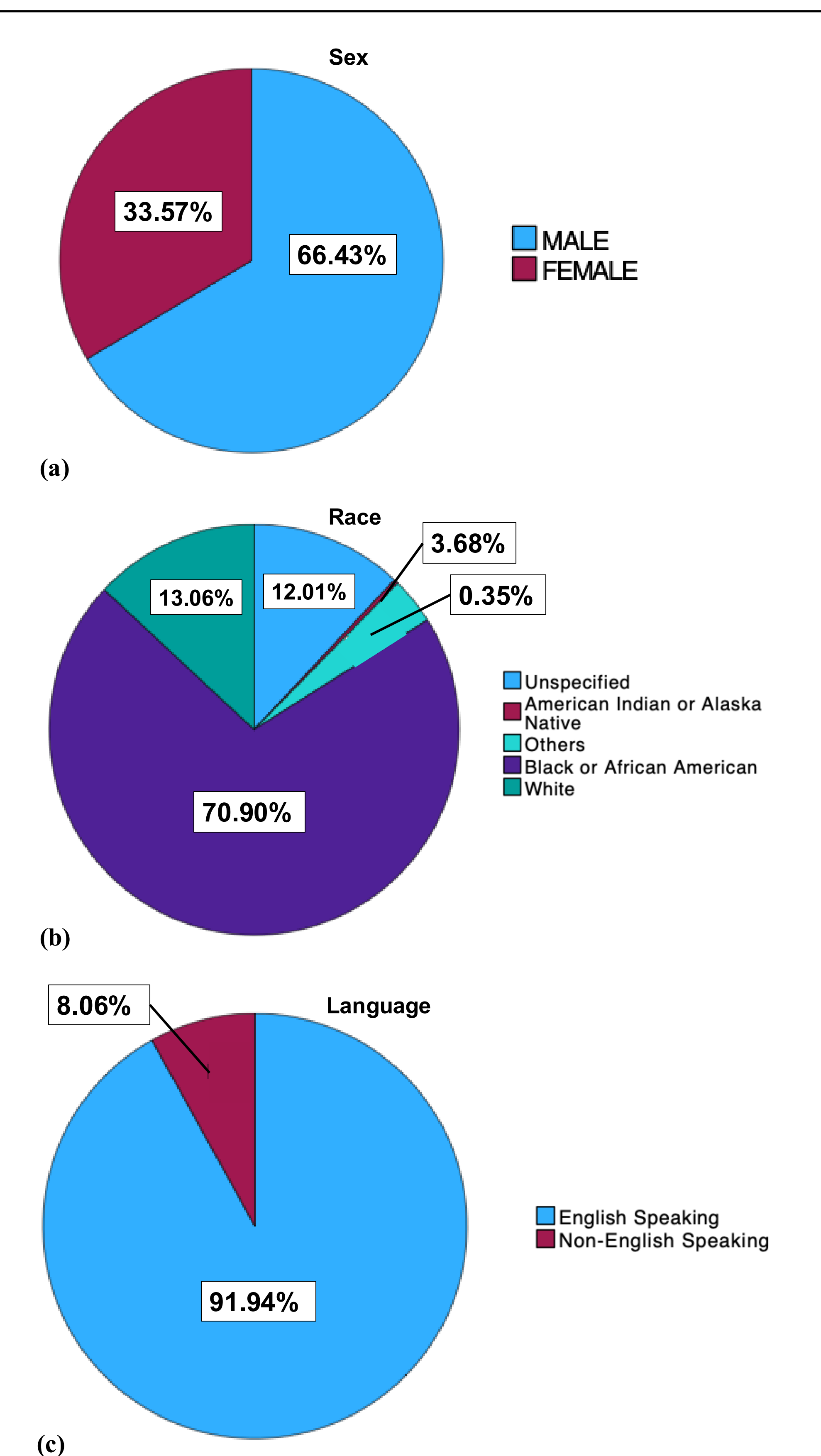


Figure 2. Demographics of patient population (a) Frequencies of patient sex. Male=66.43% (n=758), Female=33.57% (n=383) (b) Frequencies of patient reported race. Black or African American=70.90% (n=809), White=13.06% (n=149), Unspecified=12.01% (n=137), Others=3.68% (n=42), American Indian or Alaska Native=0.35% (n=4) (c) Frequencies of patient language. English speaking=91.94% (n=1049), Non-English speaking=8.06% (n=92)

Results

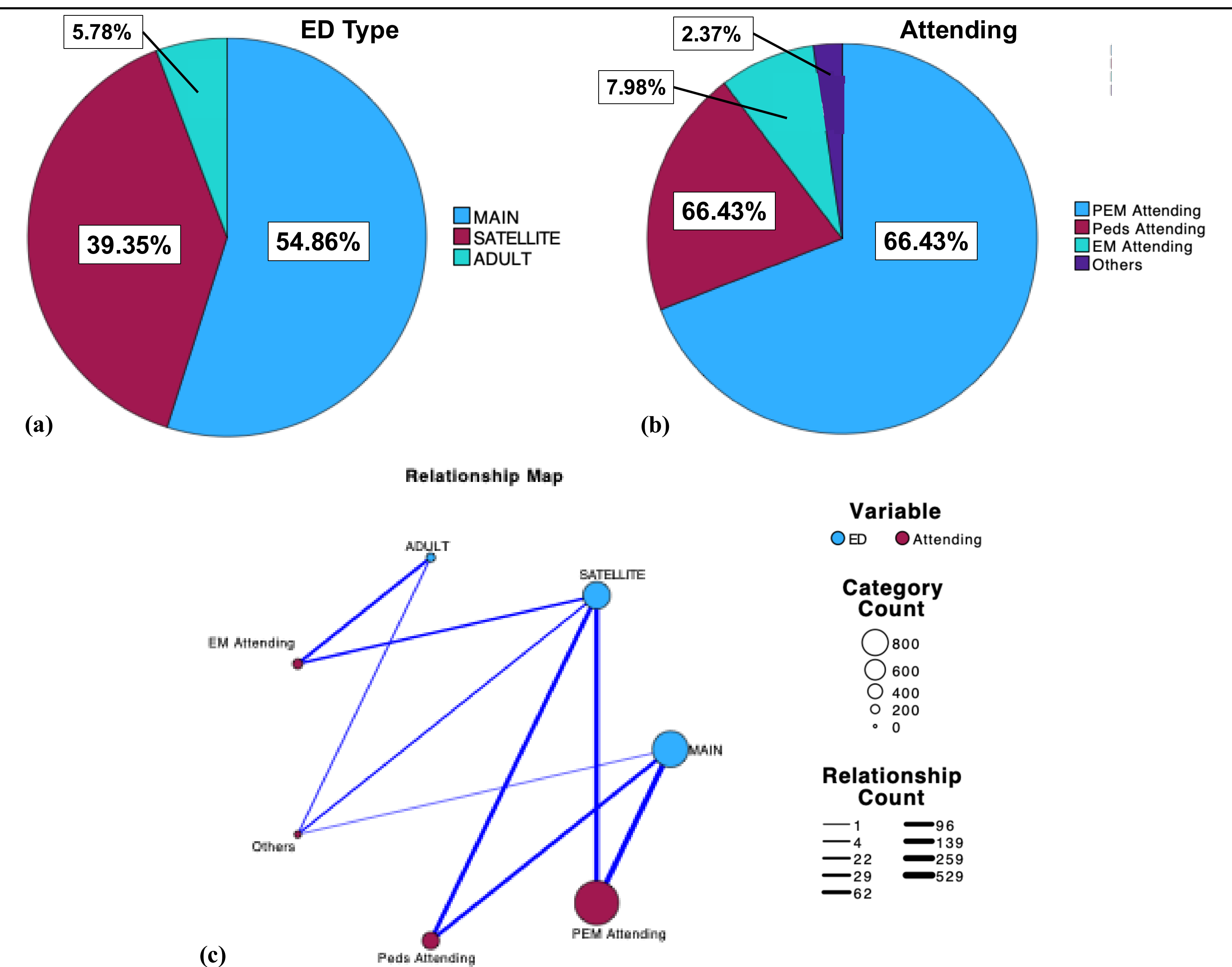


Figure 3. (a) Frequencies of encounters by ED type. Main hospital=54.86% (n=626), Satellite hospitals=39.35% (n=449), Adult community hospitals=5.78% (n=66). (b) Frequencies of encounters by attending physician specialty. Pediatric emergency medicine attending=69.06% (n=788), Pediatric attending=20.60% (n=235), Emergency medicine attending=7.98% (n=91), Other=2.37% (n=27) (c) Relationship map of physician distribution among hospital types. Significant correlation was observed between ED type and attending provider type ($r=0.55$, $s^2=0$).

Model Used	Outcome	Significant Predictors
Bayesian ANOVA	Disposition	First CRS Score ($\mu=0.101$, 95% CI: 0.081-0.122)
		Language ($\mu=0.192$, 95% CI: -0.001-0.386)
Ordinal Logistic Regression	Disposition	First CRS Score (Wald=92.38, $p < .001$)
		Time until first β -agonist administration (Wald=4.57, $p = .033$)
Multinomial Logistic Regression	Disposition	First CRS Score ($r = 0.38$, 95% CI: 0.31 to 0.44)
Binomial Logistic Regression	72-hour Bounce back	Age (Wald=11.7, $p=.003$)
	Home Steroid Rx	Age (Nagelkerke $R^2 = 0.052$, $p < .001$)

Table 1. Summary of Key Models and Predictors. Bayesian ANOVA found the overall model to be significant compared to the null and showed that the significant predictors of an ordered disposition were clinical severity and language. Ordinal regression model found a strong effect of clinical severity and a small but statistically significant effect of duration to first β -agonist administration on ordered administration. Significant correlation was observed between ED type and attending provider type type. Age consistently predicted 72 hour ED revisits, as younger patients were more likely to return to ED. Steroid prescriptions were significantly associated with age, as younger patients had significantly higher odds of being discharged with steroids.

Conclusions

- Clinical severity and timeliness of initial bronchodilator therapy are key determinants of disposition in pediatric emergency encounters
- Younger age is a consistent predictor of both bounce back risk and outpatient steroid prescribing, emphasizing the importance of age-specific management strategies and discharge planning in pediatric respiratory care