Background

- Tobacco Smoke Exposure (TSE) affects 35.4% of children in the USTSE is associated with lower respiratory tract infections and patients with influenza and TSE are more likely to be admitted to the Pediatric Intensive Care Unit (PICU).
- TSE has been associated with changes in the nasopharyngeal and the gut microbiome in children.
- Adult patients with TSE who were admitted with blunt abdominal trauma were found to have an increase in putative pathogens in their lower airways and predisposition to ARDS.

Objectives

Aim 1: To evaluate the impact that TSE has on the microbiome of critically ill children undergoing prolonged mechanical ventilation.

Aim 2: To evaluate the clinical outcomes of children with TSE.

Study Design

Prospective cohort study of children who were expected to require intubation for greater than 72 hours admitted to 8 PICUs in the Collaborative Pediatric Critical Care Research Network.

Patient Population

362 children admitted to the PICU requiring invasive mechanical ventilation.

Inclusion Criteria

- Age 31 days to 16 years
- First intubation of hospitalization
- Required mechanical ventilation for at least 72 hours.

Exclusion Criteria:

- Presence of tracheostomy or tracheoectomy expected to be placed
- Contraindication to deep tracheal suctioning
- Limitations of care in place

Methods:

- Tracheal aspirates were collected within 24 hours of intubation for microbiome analysis.
- Urine samples were collected as part of routine care within the first 96 hours of admission to the PICU.
- Urine cotinine levels were determined by liquid chromatography-tandem mass spectrometry assay.
- A cutoff of 0.3 ng/ml was used to determine TSE.

Statistical Analysis

- Cotinine was analyzed as a continuous metric adjusted for time of collection and as a binary predictor comparing the >75% to the <25%.
- Log normal linear regression model was used to assess difference in Shannon Diversity and Total Bacterial Load.

Results

- Total Bacterial Load
- Diversity

Conclusions

- A large percentage (54.6%) of our patients were exposed to tobacco smoke.
- Parental reporting remains an inadequate screening tool to determine TSE.
- Urine cotinine levels were not associated with changes in the lower airway microbiome or clinical outcomes for critically ill pediatric patients requiring prolonged mechanical ventilation.

Future research should focus on evaluating the nasopharynx and lower airways microbiome earlier in the PICU course and evaluating the host response to TSE.