The Impact of Environment on the COLDS Scoring Scale

Andrew Vogler MD; Lisa Lee MD

Department of Anesthesiology & Perioperative Medicine, David Geffen School of Medicine, UCLA

INTRODUCTION

- Children presenting with URI symptoms on the day of surgery are known to be at higher risk for perioperative respiratory complications[3-5]
- In 2014, B. Lee and August published the COLDS score to risk stratify pediatric patients with URIs.[1-2] Our group showed this score has good predictive value for perioperative adverse events (AUC: 0.69)
- Using logistic regression, we calculated a modified, component-weighted regression model, which improved upon the predictive value (AUC: 0.71)
- The predictive ability of the COLDS score varied by seasons: AUC: 0.82 in summer and AUC :0.67 in winter
- We hypothesized this difference may be due to unmeasured environmental factors, such as severity of influenza season or air quality

METHODS

- Data was collected on 1600 cases between 2017-2019

Inclusion criteria:
- ≤ 6 years old

Exclusion criteria:
- Endotracheal tube
- Tracheostomy
- Cyanotic heart disease

- Anesthesia providers completed questionnaires about their patients and perioperative events. We also recorded influenza activity, the air quality index (AQI), and presence of active wildfire within 50 miles of the hospital
- Receiver operating characteristic curves were used to assess the predictive ability of the COLDS score for PRAEs
- We created a new component-weighted regression model with influenza activity as a factor

	1	2	5
Current Signs and Symptoms	None	Mild (Parent confirms URI AND/OR congestion, rhinorrhea, sore throat, sneezing, low fever, dry cough)	Moderate/Severe (Purulence, wet cough, abnormal lung sounds, lethargy, toxic appearance or high fever)
Onset of Symptoms	>4 weeks ago	2-4 weeks ago	< 2 weeks ago
Presence of Lung Disease	None	Mild (Hx of RSV, mild intermittent asthma, BPD if >1y/o, loud snoring, or passive smoker)	Moderate/Severe (Moderate persistent asthma, infant with BPD, OSA or pulmonary hypertension)
Airway Management	None or Facemask	LMA or supraglottic airway	Endotracheal Tube
Type of Surgery	Other (Including PE tubes)	Minor airway (T/A, nasal lacrimal duct probing, flexible bronchoscopy and dental extractions)	Major airway (Cleft palate, rigid bronchoscopy, maxillofacial surgery)

Figure 1: The COLDS Scoring Scale

RESULTS

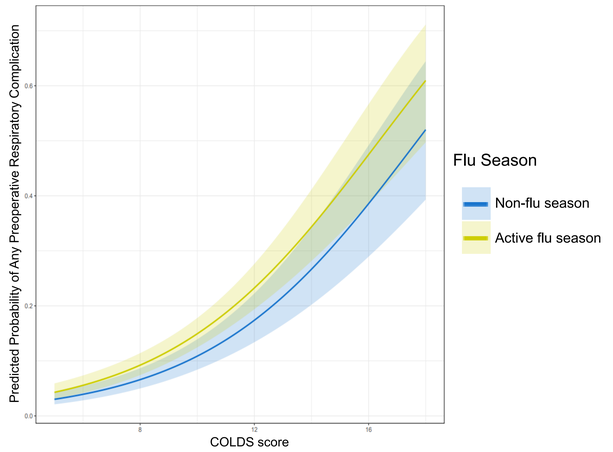

Figure 2: The Effect of Flu Season on the Predicted Probability of Perioperative Respiratory Complications

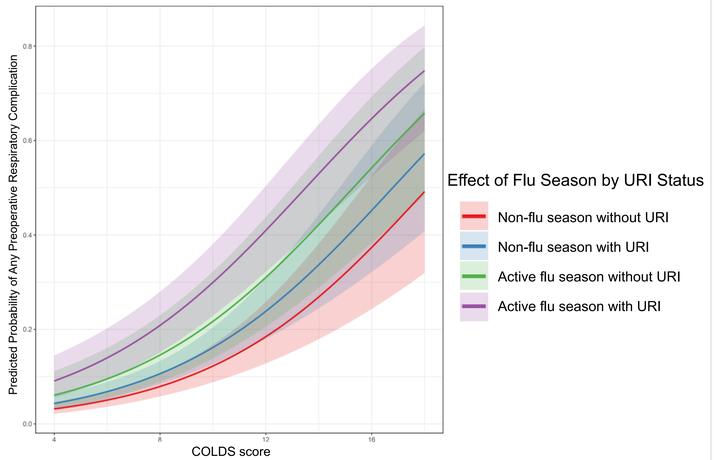

Figure 3: The Effect of Flu Season Stratified by URI Status on the Predicted Probability of Perioperative Respiratory Complications

RESULTS

- Influenza activity was an independent predictor of perioperative respiratory adverse events
  - OR = 1.68, 95% CI 1.26-2.37
- After controlling for patients with URI symptoms, influenza activity was still an independent predictor
  - OR = 1.44, 95% CI 1.17-1.67
- Air quality index (AQI) and the presence of a wildfire within 50 miles of the hospital were not independent predictors of PRAE
- Our new model with influenza activity as a factor demonstrated good predictive ability
  - AUC of 0.76, 95%CI 0.72-0.80

DISCUSSION

- While it has been previously shown that air pollution can cause an increase in respiratory symptoms in the pediatric population,[6] AQI within 50 miles of the hospital was not high enough to cause adverse events
- Further investigation into the effects of air quality surrounding patients' home environments is needed
- After controlling for URI symptoms, influenza activity is still a positive predictor, possibly due to infection without symptoms or inaccurate history from parents

REFERENCES

1. Lee, B. J. and August, D. A. (2014), COLDS: A heuristic preanesthetic risk score for children with upper respiratory tract infection. Pediatric Anesthesia, 24: 349–350
2. Lee LK et al. Pediatr Anesth. 2018;28(11):1007-1014
3. Tait AR, Malviya S, Voepel-Lewis T, et al. Risk factors for perioperative adverse respiratory events in children with upper respiratory tract infections Anesthesiology 2001;95:299 –306
4. von Ungern-Sternberg BS, Boda K, Chambers NA et al. Risk assessment for respiratory complications in paediatric anaesthesia: a prospective cohort study Lancet 2010; 376: 773–783
5. Becke, Karin. Anesthesia in Children with a Cold. Current Opinion in Anaesthesiology 2012; 25(3):333-339
6. Pope, C. A., & Dockery, D. W. (1992). Acute Health Effects of PM10Pollution on Symptomatic and Asymptomatic Children. American Review of Respiratory Disease, 145(5), 1123–1128. doi: 10.1164/ajrccm/145.5.1123