Reducing the Incidence of Cuff Overinflation During General Anesthesia

Christian Taylor, M.D. and Robert Friesen, M.D.
Department of Pediatric Anesthesiology, Children’s Hospital Colorado, Denver, CO

Background
- Airway mucosa capillary perfusion pressure is around 20-30 cm H₂O.
- Cuff overinflation can lead to mucosal ischemia.
- Airway induced adverse events include:
  - Sore Throat
  - Stridor
  - Ulceration
  - Nerve Damage
- Studies have shown a correlation between postoperative adverse outcomes and degree of overinflation.

Methods
- Project was approved by the Institutional QI Committee. (#1610-1)
- Study was divided into two phases.
  - Phase 1: Assessment of current CHCO Institutional Practice in terms of ETT and LMA cuff inflation pressures.
  - Phase 2: Introduction of an Intervention, Tru-Cuff (AES, Inc.) and assessment of post intervention results.
- 162 patients undergoing general anesthesia at a tertiary pediatric hospital were included in the study.
- Airway management was determined by the in-room anesthesia team, who performed all airway intubations.
- The cuff pressure was then separately measured by the researchers using a manometer. (Cufflator, Posey, Inc.)
- Data collected included age, gender, type of airway device, size of airway device, and cuff pressure.

Results
- Figure 1 shows the distribution of cuff pressure measurements as a percentage of total cases in their respective group.
  - In Phase 1, 52.5% and 73.8% of patients in the ETT had cuff pressures under 20 and 30 cm H₂O, respectively. The mean cuff pressure was 20 cm H₂O.
  - The LMA group in Phase 1 was highly variable in distribution, with a mean of 61 cm H₂O.
  - After introduction of the intervention, the cuff pressures in the LMA group decreased to a mean of 25 cm H₂O.
  - The reduction in cuff pressures in the LMA group was significant (p<0.0001)

- Figure 2 shows the box and whisker plot of cuff pressures of the groups.
  - The whiskers (vertical black lines) represent the minimum and maximum range of measured values.
  - The colored boxes represent the interquartile range of measured values.
  - The horizontal line inside each box represents the median value of the group.
  - Of note, the measurement of ETT cuff pressures was suspended due to a satisfactory assessment of current practice, while the intervention was implemented for the LMA group.

Conclusions
- Current management at CHCO regarding ETT cuff pressures is satisfactory and further intervention to prevent adverse events is likely to have minimal effect.
- Current LMA practice without manometry frequently leads to variable and unacceptably high cuff pressures.
- The introduction of a pressure regulated syringe caused a decrease in LMA cuff pressures to satisfactory levels.
- Routine use of manometry and/or pressure regulated syringes for LMA cuff inflation is recommended.

Implications
- Current management at CHCO regarding ETT cuff pressures is satisfactory and further intervention to prevent adverse events is likely to have minimal effect.
- Current LMA practice without manometry frequently leads to variable and unacceptably high cuff pressures.
- The reduction in cuff pressures in the LMA group was significant (p<0.0001)

References