

Catheter Depth Control During Endotracheal Tube Exchanges in an Airway Manikin; A Comparison of a Novel Color-Zoned Qualitative System vs Traditional Quantitative System

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Problem: Lack of depth control of airway introducers and exchange catheters is the prime cause of airway injuries and failed intubations when these devices are used.^{1,2,3}

Hypothesis: Catheters with a qualitative color zoned depth control system, designed to be visually monitored with a video laryngoscope, at the level of the vocal cords, can improve catheter depth control during airway procedures.

Study design: 22 faculty anesthesiologists or senior residents performed 3 endotracheal tube exchanges in an airway manikin each with differing visual feedback and either qualitative or quantitative depth control markings.

Exchange 1: Exchange catheter with standard numeric depth markings (quantitative). The exchange was performed without a laryngoscope.

Exchange 2: Exchange catheter with standard numeric depth markings (quantitative) and a video laryngoscope to monitor exchange at the glottis.

Exchange 3: Exchange catheter with novel, qualitative color-zone depth control markings on the catheter tip and a video laryngoscope to monitor the exchange at the glottis.

Data Gathering

All exchanges were monitored in two ways:

1. All airway exchange catheters were fitted with a magnet in the tip and a magnetometer was used to monitor tip depth in the trachea throughout all exchanges;
2. A video, at the level of the glottis, was taken of all exchanges.

End points for catheter tip depth in the trachea:

- 1) Shallowest point during procedure
- 2) Deepest point on initial insertion of exchange catheter
- 3) Deepest point during entire procedure
- 4) Number of incursions into the bronchus
- 5) Total tip excursion

Results: Results are presented in Figure 1.

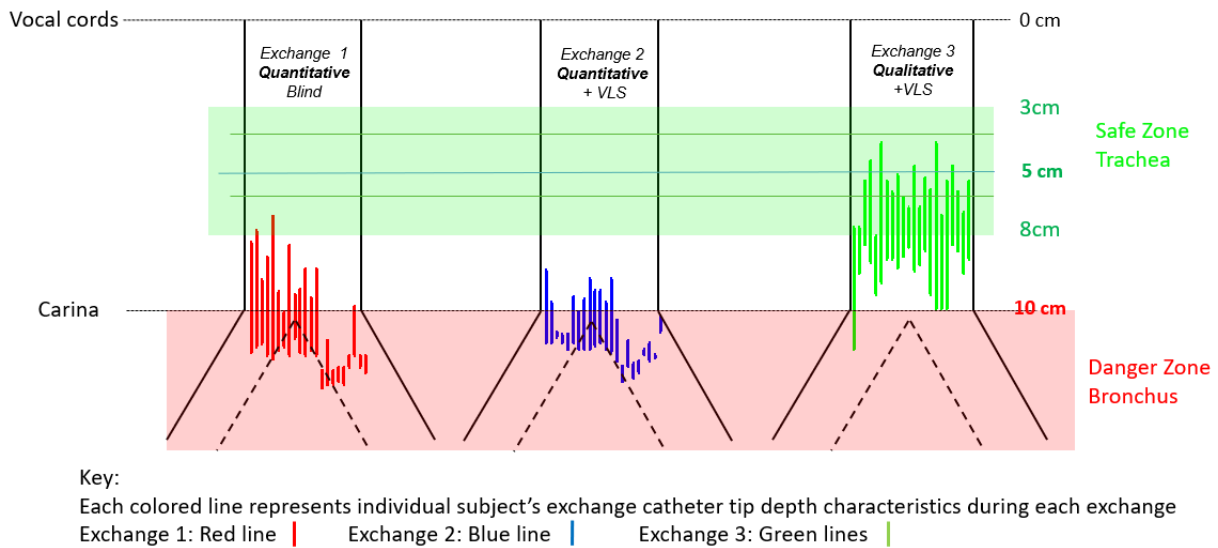


Figure 1: CATHETER TIP DEPTH IN TRACHEA AND BRONCHUS DURING AN ENDOTRACHEAL EXCHANGE WITH 3 DIFFERENT DEPTH MONITORING TECHNIQUES

Conclusion: Airway exchange catheters with qualitative color zoned depth markings the decreases tip travel below the carina when used with a video laryngoscope during endotracheal exchanges in an airway manikin. Improved catheter depth control could lead to safer endotracheal exchanges in humans.

References:

1. Harris K. Endotracheal tube exchangers: should we look for safer alternatives? *Heart Lung*, 201;41(1):67-9
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3. Sheron McLean. Airway Exchange Failure and Complications with the Use of the Cook Airway Exchange Catheter®: A Single Center Cohort Study of 1177 Patients. *Anesth Analg* 2013;117:1325–7