Sustaining Best Practice: Revisiting Endotracheal Tube Cuff Pressure Assessment Methods in Anesthesia Providers

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Abstract

Endotracheal tube (ETT) cuff pressure plays a critical role in preventing complications such as aspiration, mucosal injury, and post-operative sore throat in patients undergoing anesthesia. Maintaining an optimal cuff pressure is essential to avoid adverse outcomes; however, common inflation techniques often lead to inaccurate pressure levels. This project aims to assess the impact of anesthesia provider education and the use of manometers on ETT cuff pressure management at a trauma center in the Florida Panhandle. Previous data indicated an average cuff pressure of 54 cmH_2O at the trauma center. This study investigates cuff pressures after the distribution of manometers and educational interventions aimed at improving cuff pressure monitoring. A convenience data collection method was employed to assess cuff pressures in adult surgical patients, documenting variables such as provider experience and ETT size. Results were analyzed against prior data to evaluate the effectiveness of these practice changes in achieving optimal cuff pressures. The findings highlight the importance of education, manometer use, and documentation in improving patient outcomes, with implications for sustained quality improvement in anesthesia practice.

Introduction

In the United States, up to 20 million intubations occur every year (Nadeem et al., 2017). Most of the ETTs used for intubation have a cuff that is inflated below the vocal cords. A properly inflated ETT cuff helps to prevent aspiration and facilitate positive pressure ventilation (Butterworth et al., 2018). Over-inflation can contribute to post-operative sore throat, ischemia, inflammation, and mucosal or vocal cord injury (Efrati et al., 2012; Fritz et al., 2020; Ganason et al., 2019; Stewart et al., 2003). Current guidelines provide a range of 20-30 cmH2O as the recommendation for ETT cuff pressure (Karbing et al., 2020). Direct measurement of cuff pressure with a manometer provides the greatest accuracy and precision for ETT cuff pressure assessment (Couturier et al., 2023; Stewart et al., 2003).

In 2023, a group of doctoral nurse anesthesia scholars conducted research investigating ETT cuff pressures at a trauma center in the Florida Panhandle. They found that the average cuff pressure at the trauma center was 54 cmH_20 (Couturier et al., 2023). This project aims to assess the outcomes following anesthesia personnel education and manometer distribution.

PICO Question

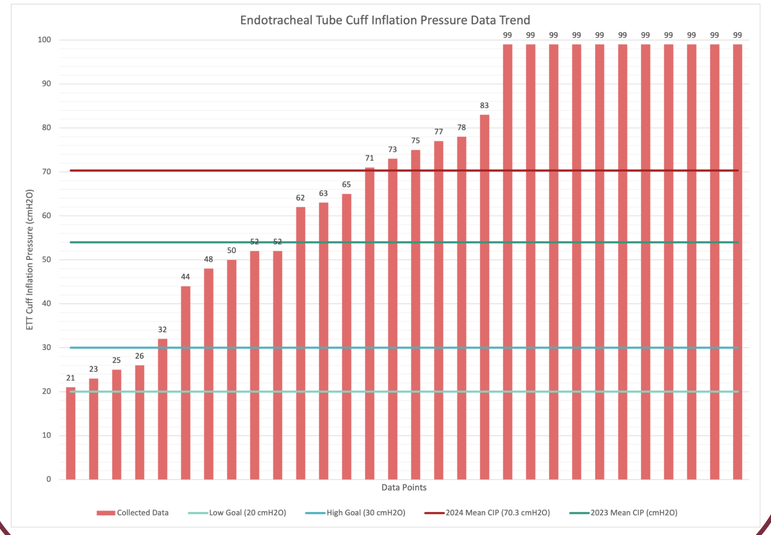
The new project seeks to determine: Do adult surgical patients undergoing endotracheal intubation in a clinical setting (P) where anesthesia providers use manometers to assess cuff pressure after cuff assessment was provided (I) compared to anesthesia providers that do not (C) have cuff pressure in an ideal range (O)?

Methods

To evaluate the effectiveness of the practice change, the current follow-up study was conducted in the perioperative area of the trauma center. For this study, thirty data points were collected using newly calibrated AG CUFFILL manometers. Researchers collected data in the operating rooms in an unannounced and randomized manner to minimize potential bias. Only surgical procedures performed in the operating rooms of the facility on adult patients where a standard ETT was utilized were assessed. During each encounter, anesthesia providers were asked standardized questions regarding their credentials, years of experience, size of syringe used to inflate ETT cuff, and pressure assessment method. Data collectors corrected ETT cuff pressures to fall within the recommended range following data collection to safeguard patients from adverse outcomes. The collected data was analyzed and compared to the previous year's findings to assess the impact of the practice change on ETT cuff pressure compliance.

Results

Thirty data points were collected and the raw data obtained from the collection phase was analyzed utilizing IBMs Statistical Package for Social Sciences to obtain descriptive statistics. The mean ETT cuff pressure was 70 cmH_2O as compared to 54 cmH_2O in the previous year.



Discussion

The evaluation of this practice change revealed that exposing anesthesia providers to evidence-based practice did not result in a change. Despite the implementation of key interventions, including the dissemination of evidence-based recommendations and provision of manometers, the mean ETT cuff pressure increased in comparison to the previous year (from 54 cmH2O to 70 cmH2O). While the percentage of ETT cuff pressures within the recommended range increased (from 10% to 13%), the improvement is marginal and warrants evaluation. These outcomes underscore the challenges inherent in incorporating evidence-based findings into sustained clinical practice. Potential barriers to manometer use and vigilance surrounding ETT cuff pressures may include workflow time constraints, unfamiliarity with manometers, lack of reminders to assess cuff pressure intraoperatively, high turnover of anesthesia providers, and resistance to practice change. Accessibility to manometers was a barrier despite the previous cohort providing manometers to the site. Anesthesia provider compliance proved to be difficult due to some providers viewing the use of manometers as an additional task causing increased work and cognitive load.

An area for improvement identified in this study was the inability to document ETT cuff pressures in the patient electronic medical record (EMR). Were the EMR to prompt each anesthesia provider to document ETT cuff pressure, then perhaps providers would be more inclined to measure and document ETT cuff pressures. Integration of cuff pressure documentation into the EMR could be the missing factor in standardizing cuff inflation pressure assessment at this site. The findings highlight the fact that anesthesia provider education and equipment access are not sufficient to motivate change.

Conclusions

A sustained practice change requires cooperation from the anesthesia provider to accept the evidence for manometer use and employ it in everyday practice. The data collected in this project can be used to educate and effect change by exposing the providers to collective cuff pressures and encourage improvement. This project aims to leave the site of our data collection with all the tools necessary to enact change:

- New educational brochures in the anesthesia work spaces
- Increased access to manometers
- Promoting EMR documentation of ETT cuff pressures

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