Importance of cuff pressure management

Maintaining optimal cuff pressure (20 to 30 cmH2O) in a patient intubated with an endotracheal tube can reduce the probability of complications. Both over-inflation and under-inflation carry unique risks that can worsen patient outcomes. As illustrated in Figure 1, an over-inflated cuff (pressure greater than 30 cmH2O) can exert pressure on the tissue of the trachea; this is the main risk factor for tracheal injury during endotracheal intubation. Tracheal injury can occur in these situations because the overinflated cuff compresses the tracheal mucosa, leading to reduced blood flow to the tracheal tissue, in turn potentially causing ischemic injury. On the other hand, under-inflation of the cuff (less than 20 cmH2O), can lead to an inadequate seal between the tracheal tissue and the cuff. The lack of a tight seal creates a passageway for contaminated secretions to pass into the lungs, making cuff under-inflation a risk factor for ventilator-associated pneumonia (VAP).

Challenges in establishing and maintaining optimal cuff pressure

Upon initial placement of the endotracheal tube, cuff pressure should be set at 20-30 cmH2O; however, clinicians often face difficulty with manually setting the cuff pressure to this range. In addition, manual monitoring and adjustment of cuff pressure can be labor intensive and largely ineffective. In the absence of a continuous monitoring device, hospital staff must intermittently check cuff pressure and manually adjust. Several studies indicate this practice leads to cuff under- or over-inflation for significant periods of time, with studies reporting under- or over-inflation occurring between 51-88% of the time. One study did find that augmenting manual systems with alarms that indicate when cuff pressure is out of range did significantly increase the amount of time patients spent at optimal cuff pressure, but this process was also found to be labor intensive for the hospital staff.
Benefits of automatic, continuous cuff pressure management devices

Devices that continuously monitor and manage cuff pressure detect when pressure is outside of a preset range, and then automatically adjust the pressure so that it returns to the target pressure set by the clinician. Studies comparing automatic, continuous cuff pressure monitoring versus manual, intermittent monitoring find that the time spent within the optimal range for the automatic devices greatly exceeds the manual technique, with patient time spent in the optimal pressure range at 99-100% with the automatic devices. Critically, this translates to patient benefits, as a recent meta-analysis found that the rate of VAP when using continuous control devices is significantly lower compared to routine, manual methods.

IntelliCuff—The intelligent standard in cuff pressure management

IntelliCuff is an electronic cuff pressure management device that automatically monitors and adjusts cuff pressure, allowing the patient to spend prolonged periods of time with the cuff at optimal pressure. Bench-top research utilizing manikins with lung and trachea models indicated IntelliCuff maintained cuff pressure within 3.5-5.7% of the target value within set periods of time, whereas the manual technique of maintaining cuff pressure resulted in decreases ranging from -14.39% to -39.6%. IntelliCuff also comes equipped with alarms to indicate if the cuff is leaking, the tube disconnects, or there is excessive pressure. Additionally, IntelliCuff deflates the cuff on command, aiding in safely extubating the patient. By combining effective safety features with best-in-class automatic, continuous cuff pressure management, IntelliCuff helps to reduce the complications associated with cuff under- or over-inflation during endotracheal tube intubation, without placing an excessive burden on hospital staff.

Figure 2: IntelliCuff® cuff pressure management device.

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