Block 7 CAT
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Airway control in case of a mass toxicological event: superiority of second-generation supraglottic airway devices. American Journal of Emergency Medicine. 32 (2014) 1445–1449

Clinical Question: What method of airway control is most likely to be successful in a stressful and uncomfortable environment, especially where the care provider may be wearing personal protective equipment that can often hinder visibility and tactile function?

Introduction:
Though endotracheal intubation is considered the gold standard for airway control, direct laryngoscopy ET insertion is highly operator-dependent. Given that we have access to other types of airway devices, such as the 1st gen LMA, King-LTS airway (laryngeal tube suction), and supreme laryngeal mask airway (SLMA), this study looked at how they compare to each other with regard to successful airway control, number of attempts required, and time to achieve airway control.

Methods:
One-hundred seventeen individuals from multiple provider roles were selected for this study based on a convenience sample in the Israeli military, which consisted of Medics, Paramedics, General Practitioners, Residents from various specialties, and Anesthesiologists. A randomized cross-over trial was conducted by randomly assigning each provider to three different procedure stations without PPE (personal protective equipment) and three stations with PPE, for airway control using different devices on trainer mannequins. A workshop was conducted initially to ensure that each provider was aware of the technical aspects of each device. Three unsuccessful attempts were considered failure of airway control. Successful airway control was confirmed by bilateral lung expansion on the model, using bag valve ventilation. Dichotomous measures were analyzed with χ^2 tests and continuous variables using the Student t test.

Results:
There were very few failed attempts (only 9 failed procedures) and all of these occurred with ET intubation. In comparison to the supra-glottic airways, time to airway control was 88% longer with ET intubation ($p<.0001$), and this was consistent across all provider levels. Mean time to successful airway control with ET intubation was 31.7 seconds, versus 17.2, 18.1, and 17.7 seconds with the supra-glottic devices (LMA, King, and Supreme-LMA, respectively). The delay with ET intubation was preserved in both the PPE and non-PPE comparisons. More attempts were required with ET intubation when compared with the supra-glottic airways ($p<.001$)—1.11 attempts versus 1.00, 1.01 and 1.01.

Main limitations:
The use of mannequins, in a controlled simulation setting is not likely to approximate the anatomic variability seen in the general population, or replicate the stressors associated with securing an airway in an out-of-hospital or combat setting. Though this study compares direct laryngoscopy ET intubation to the supra-glottic airways, it does not include video laryngoscopy in the comparison. Considering these limitations, the fact that these various airway control approaches were tested in this study under standardized settings is favorable in that it allows for comparison while avoiding real-world confounding variables that would have been difficult to account for.

Conclusions:
The shorter time to intubation and fewer attempts before successful intubation suggest that in situations where environmental conditions require rapid airway management—whether because of disease pathology or because of risk of harm to the provider—supra-glottic airway devices are preferable to endotracheal intubation. In addition, these benefits are preserved in settings where PPE worn by the provider can further obstruct successful

airway control. Also note that the King-LTS and Supreme-LMA airways provide for easy NG tube insertion via a port, for facilitated GI decompression.