

Emergent Cricothyrotomy Training for Non-Surgeons

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Abstract:

Purpose: Cricothyrotomies are lifesaving procedures performed in critical care (CC) and emergency settings when an oral endotracheal (ET) intubation is not possible. Simulations are the main method of training and are usually performed in simulation labs on synthetic materials or pig tracheas. Cadaveric training is superior to simulation training due to landmark and tissue fidelity, but it is uncommon due to cost and access.

Methods: We implemented a program to train non-surgeon fellows and attendings on cadaveric donors from anatomy programs at CU Anschutz. The training was expanded with an enhanced curriculum that included an educational video, bronchoscope monitoring, live coaching, and training with both the bougie-6.0 ET tube and Seldinger kit methods.

Participants responded to a pre- and post-survey that assessed their confidence and anxiety with performing a cricothyrotomy on a 4-point Likert scale, and the subjective benefits of the enhanced curriculum. As cricothyrotomies are emergency procedures that need to be performed quickly and accurately, we also reviewed the endoscopic recordings to track duration and any aberrancies in procedure.

Results: Response rate for the first session of 10 participants was 100% and showed that the session was helpful to all participants. After the training, 80% of participants showed an improvement in confidence with performing a cricothyrotomy and 40% had a reduction in anxiety. We aim to follow up the survey data as part of a longitudinal study to determine whether subjective improvement in confidence and anxiety from the training contributes to better outcomes in the field.

20 endoscopic recordings were analyzed, 10 from the bougie method and 10 from the kit method. They revealed that 1 trocar needle hit the posterior tracheal wall and 2 scalpels passed the midpoint of the trachea lumen. Additionally, 1 bougie was placed parallel to the trachea but not within it which was made immediately clear through the endoscopic visualization allowing for rapid coaching and a thereafter successful intubation. The mean PTTT in our study was 29.2 ± 12.7 s, with the outlier at 83s excluded due to interruption during the practice.

Conclusions: Endoscopic enhancement of cadaveric cricothyrotomy training was valued by trainees and allowed for monitoring of procedure time and adverse events. In 20 attempts there were 4 aberrancies in procedure that reflected possible complications in the field, such as damage to the posterior trachea or failed airway access. As rapid intubation is paramount, we compared data from several studies and considered a successful cricothyrotomy to be performed in <40s. Our times were likely faster than this on average because participants could prepare with the training video and had intra-procedure access to coaching. Cadaveric cricothyrotomy training enhanced with a training video, endotracheal endoscopy, and expert coaching results in improved confidence, rapid procedures and refined technique that may help avoid real-life complications. The initial sessions are a successful proof of concept for the enhanced curriculum, and future sessions will allow us to further interrogate the significance utilizing control groups.