**Paramedic CAT (Critically Appraised Topic)**

01/03/2020

**Title**: The Efficacy of Endotracheal Intubation compared to Supraglottic Airways

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**Clinical Scenario:**
A 56-year-old male is found lying supine on the floor unconscious by his wife. The wife called 9-1-1 and the dispatchers asked if the man was breathing. The wife quickly realized he was apneic, and the dispatchers told her to start doing chest compressions. The nearest crew of paramedics were immediately notified and were dispatched CODE 4 (highest priority) to the caller's address. The primary care paramedics (PCP's) arrived 3 minutes after they were notified and quickly confirmed the patient was in cardiac arrest. They initiated their medical cardiac arrest protocols and began CPR with manual defibrillation. After their second analysis they inserted a King-LT (supraglottic airway) to perform continuous compressions and ventilations. Advanced are paramedics (ACP's) arrive on scene and quickly switch out the King-LT and intubate the patient. Does endotracheal intubation result in better ventilations and improved patient outcomes compared to a supraglottic airway, or should the King-LT remain as the advanced airway device?

**PICO (Population - Intervention - Comparison - Outcome) Question:**
In out of hospital cardiac arrest patients, does endotracheal intubation compared to a supraglottic airway result in improved patient outcomes?

**Search Strategy for MEDLINE:** (paramedic OR ems OR emergency medical service OR prehospital OR pre-hospital OR ambulance OR emergency medical technician OR emt) AND (out of hospital cardiac arrest OR ohca OR pre-hospital cardiac arrest OR pre hospital heart arrest) AND ((airway management OR endotracheal intubation OR intubation OR insertion of an endotracheal tube or eti) AND (supraglottic airway or lma or igel or sga or king-lt)) AND (ventilations OR mechanical ventilations OR neurological outcomes or patient outcomes or hospital discharge)
Limits: last 5 years, peer-reviewed, English
**Search Strategy for ScienceDirect(max of 8 Boolean operators): (**prehospital AND out of hospital cardiac arrest) AND (airway management OR intubation) AND (supraglottic airway OR igel OR king-lt) AND (neurological outcomes OR positive outcomes)
Limits: Research Articles and Review Articles, 2015-2020

**Search Outcome:** 140 results (ScienceDirect: 106 MEDLINE: 34)

**Relevant Papers:** 3 were chosen as relevant for this CAT

| Author, Date | Population: Sample Characteristics | Design (LOE) | Outcomes | Results | Strengths/Weaknesses |
|---|---|---|---|---|---|
| (White, Melhuish, Holyoak, Ryan, Kempton & Vlok, 2018) | 29 Studies Reviewed: *n=539,146* | -Systematic Review and meta-analysis of five data bases<br><br>**Inclusion**:<br>-OHCA or CPR<br>-ETI vs SGA<br>**Exclusion**:<br>-Simulations<br>-Selective studies<br>-in-hospital cardiac arrest<br>LOE:1 | -Increase in ROSC<br>-Increased survival to hospital admission<br>-Increased survival to discharge<br>-Improved neurological outcomes | -23 studies (*n=297,158)* investigated ROSC, ETI showed heterogenous increase in ROSC (OR=1.44; 95% CI 1.27-1.63; $I^2$=91%; p<0.00001)<br>-14 studies (*n=440,564)* investigated survival to admission, ETI showed heterogenous increase in survival to admission (OR=1.36; 95% CI 1.12-1.66; $I^2$=91%; p=0.002)<br>-22 studies (*n=440,564)* investigated survival to discharge, ETI showed no significant difference SGA's (OR=1.28; 95% CI 1.02-1.60; $I^2$=96%; p=0.03)<br>-14 studies (*n=438,261*) investigated discharge with a neurologically intact state, ETI showed no significant difference with SGA's (p=0.16)<br>**Conclusion:** ETI showed increased chance of getting a ROSC, however it did not show improved or worsened patient outcomes. | +Relatively up to date systematic review, best evidence available<br>+No conflicts of interest<br>+Strong Size of Study<br><br>-lack of RCT's, and significant number of retrospective studies<br>-The 5 RCT's used in the review utilized different SGA's which can impact the results<br>-Evidence was all judged to be low quality evidence |

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| (Becker, Berning, Prabhu, Callaway, Guyette & Martin-Gill, 2018) | -126 had met criteria<br>-84 (66.7%) had an Endotracheal Tube (ETT) placed<br>-42 (33.3%) had SGA's placed | -Retrospective observational study<br>-Review of electronic records from 3 EMS agencies<br>**Inclusion:**<br>-OHCA patients<br>-Mechanical CPR was used<br>-Advanced airways were used (LOE:3) | -ROSC<br>-24-hour survival<br>-etCO2 readings | -The ETT and SGA groups had no difference in ROSC (p=0.13) or survival at 24h (p=0.52)<br>-etCO2 markers showed no significant difference between the use of ETT's or SGA's | +Used etCO2 as a marker to compare the two airway devices<br>+CPR was limited to mechanical, therefore identical in quality and minimal time off chest<br>-Small Sample Size<br>-Retrospective study<br>-Selection Bias, Information Bias<br>-Specific demographic, may not translate to all OHCA patients |

| Author, Date | Population: Sample Characteristics | Design (LOE) | Outcomes | Results | +Strengths/ -Weaknesses |
|---|---|---|---|---|---|
| (Edwards, Williams & Cottee, 2019) | 220 adult (≥18 years) patients were included who suffered out-of-hospital cardiac arrest and were transported to a heart attack center (HAC). Inclusion Criteria: Patients that achieved ROSC and airway management was used with ventilations given. 7 had insufficient clinical data and 4 were lost to follow up due to transfer to a hospital not part of the study.<br>Total Sample: *n*=209<br>Received ETI: *n*=57<br>Received SGA: *n*=152 | Retrospective observational study using an EMS cardiac arrest registry and their respective Hospital reports/notes. (LOE:2) | -Cerebral performance category at discharge (CPC 1-5)<br>-Odds of poor outcome with ETI versus SGA | Odds Ratio:<br>-Unadjusted-All cases (1.07, 95% CI 0.93-1.32)<br>-Unadjusted-Non-Shockable cases (1.11 95% CI 1.01-1.28)<br>-Unadjusted- Shockable cases (1.01 95%CI 0.74-1.40)<br>-Adjusted with bystander CPR, witnessed arrest, shockable rhythm (0.84 95%CI 0.34-3.13)<br>-Adjusted with time to ROSC, age, shockable rhythm (0.90 95%CI 0.37-2.19)<br>**Conclusion:** There was no significant difference in neurological outcomes with endotracheal intubation or the use of SGA's. | +Adjusted for variables and clinical circumstances that would already produce negative outcomes<br>+Demographics were similar for both ETI and SGA use<br>- Being a retrospective design, there is selection bias and may be information bias.<br>-Sample was only taken from one hospital, and a specific group of OHCA patients, therefore this study may not translate for all OHCA patients<br>-Small sample size compared to similar studies |

**Comments:**
Most of the evidence for this topic comes from retrospective data and because of this it is hard to isolate all the variables to show exactly how one airway device may be more beneficial than another.

**Consider:**
Based on the outcomes outlined above, I would not change current practice as the evidence in the literature is mostly of lower quality. Also, there seems to be very little to no difference at all in the functioning and outcomes of these airway devices. Whatever device is currently used in the agency should remain as the preferred device as the most important factor is how quickly the paramedics are able to insert it, and how comfortable they are with using it.

**Clinical Bottom Line:**
Paramedics should remain using their airway devices outlined in their medical directives. There seems to be no benefit from one device over the other. However, if intubation is within the paramedic's skill, they should not opt out for a supraglottic airway unless it is their only option because upon arrival at the hospital the patient will require intubation anyway. One consideration to be made is that if a supraglottic airway is already inserted by a PCP crew, an ACP crew should not swap out the airway device to a endotracheal tube as it most likely will not benefit the outcomes of the patient.

**References:**


Becker, T. K., Berning, A. W., Prabhu, A., Callaway, C. W., Guyette, F. X., & Martin-Gill, C. (2018). An assessment of ventilation and perfusion markers in out-of-hospital cardiac arrest patients receiving mechanical CPR with endotracheal or supraglottic airways. *Resuscitation*, *122*, 61–64. https://doi.org/10.1016/j.resuscitation.2017.11.054

Edwards, T., Williams, J., & Cottee, M. (2019). Influence of prehospital airway management on neurological outcome in patients transferred to a heart attack centre following out-of-hospital cardiac arrest. *Emergency Medicine Australasia, 31*(1), 76–82. https://doi-org.ezpxy.fanshawec.ca/10.1111/1742-6723.13107

White, L., Melhuish, T., Holyoak, R., Ryan, T., Kempton, H., & Vlok, R. (2018). Advanced airway management in out of hospital cardiac arrest: A systematic review and meta-analysis. *American Journal of Emergency Medicine*, *36*(*12*), 2298–2306. https://doi-org.ezpxy.fanshawec.ca/10.1016/j.ajem.2018.09.045