**The use of Extra-Glottic Devices versus Endotracheal Intubation in Prehospital Airway Management: A Tailored Rapid Review for Emergency Health Services Nova Scotia**

*A product of the Dalhousie University Division of EMS*
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Objective:

To collect and report the results of the most current and best available evidence on the use of extra-glottic devices (EGD) versus endotracheal intubation (ETI) in prehospital emergency airway management by paramedics.

Review Question:

P – In adult patients requiring emergency airway management
I – does the use of an EGD
C – vs. ETI
O – result in differences related to:

- Survival
- Time to insertion
- Adverse events
- Oxygenation

Inclusion Criteria:
English language available
Must compare ETI versus EGD
Primary literature or formal systematic review
Must include an a priori outcome of interest
Setting must be prehospital, ED, OR/anesthesia, cadaveric, simulation

Exclusion Criteria:

Protocols
Incomplete studies
Pediatric only (EGD are not used in pediatric patients in our setting)
Studies investigating EGDs as a conduit to ETI
Low-middle income/resource settings
Animal studies

Note: This is a fairly well researched area. Because of this and familiarity with the existing body of evidence; we justify limiting our search to only the best available study designs. We will preference studies in the EMS setting comparing ETI vs LT or I-gel. LMA devices are not used in our setting of interest and will only be included if there is insufficient literature on devices generalizable to our setting. Simulation studies and operating suite studies will be considered only if there is insufficient literature in the EMS setting.

Search:

Performed in PubMed on February 19, 2019

(((((((("Emergency Medical Services"[mh] OR "Emergency Medical Technicians"[mh] OR paramedic*[tiab] OR "emergency medical technician*"[tiab] OR prehospital[tiab] OR pre-hospital[tiab] OR "out of hospital"[tiab] OR first responder*[tiab] OR emergency responder*[tiab] OR ambulance[tiab])))))) AND (extraglottic OR Extra glottic OR Laryngeal tracheal OR Laryngeal-tracheal OR KING LT OR Laryngeal mask OR LT OR EGD OR SGD)) AND ("Intubation, Intratracheal"[Mesh] OR intubation OR endotracheal OR ETI)) AND (((((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized[tiab] OR placebo[tiab] OR "Clinical Trials as Topic"[mesh: noexp] OR randomly[tiab] OR trial[ti])) OR (systematic[sb])) NOT (editorial[pt] OR guideline[pt] OR letter[pt] OR news[pt] OR newspaper article[pt] OR (animals[mh] NOT humans[mh])))

Results:

Titles: 94
Included for full text review: 22
Included for analysis: 5

Table 1: Included and excluded studies

| Author | Published Year | Include/exclude | setting |
|---|---|---|---|
| White L. (1) | 2018 | Include | EMS |
| Benger J.(2) | 2016 | Include | EMS |
| Wang HE.(3) | 2018 | Include | EMS |
| Benger JR.(4) | 2018 | Include | EMS |
| Jensen JL.(5) | 2010 | Include | EMS |
| Khosravan S.(6) | 2015 | Exclude (not preferred device) | EMS |
| Reinhart DJ.(7) | 1994 | Exclude (wrong setting) | OR medic/RT |
| Hansen ML.(8) | 2017 | Exclude (wrong population/Peds only) | EMS |
| Leventis C.(9) | 2014 | Exclude (wrong setting) | SIM |
| Saeedi M.(10) | 2014 | Exclude (wrong setting) | SIM |
| Mitchell MS.(11) | 2012 | Exclude (wrong setting) | SIM |

| | | | |
|---|---|---|---|
| Cinar O.(12) | 2011 | Exclude (wrong setting) | SIM |
| Ruetzler K, Roessler B.(13) | 2011 | Exclude (wrong setting) | SIM |
| Ruetzler K, Gruber C.(14) | 2011 | Exclude (wrong setting) | SIM |
| Castle N.(15) | 2011 | Exclude (wrong setting) | SIM |
| Wahlen BM.(16) | 2009 | Exclude (wrong setting) | SIM |
| Hoyle JD.(17) | 2009 | Exclude (wrong setting) | SIM |
| Wiese CH.(18) | 2008 | Exclude (wrong setting) | SIM |
| Chen L.(19) | 2008 | Exclude (wrong setting) | SIM |
| Kurola J.(20) | 2004 | Exclude (wrong setting) | SIM |
| Calkins MD.(21) | 1999 | Exclude (wrong setting) | SIM |
| Fouche PF.(22) | 2013 | Exclude (wrong comparison) | EMS |

Table 2: Included study characteristics and results

| Author | Year | setting | Design | LOE | population | interventions | Outcomes |
|---|---|---|---|---|---|---|---|
| Wang HE.(3) | 2018 | EMS | Multi-center pragmatic cluster-crossover clinical trial | 1 | OOHCA | LT VS ETI | 72 hr survival, ROSC, Survival to DC, favorable neurologic status at DC, key adverse events |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| White L.(1) | 2018 | EMS | Meta-analysis (some non-RCT observational comparison studies) | 2 | OOHCA | ETI vs SGA | ROSC, survival to hospital admission, survival to hospital discharge, survival to discharge with a cognitively intact state |
| Jensen JL.(5) | 2010 | EMS | Systematic Review of controlled trials | 2 | OOHCA or OOHRA | ETI vs EGD | Survival, neurologic outcomes, airway management success rates, complications |
| Benger JR.(4) | 2018 | EMS | Multicenter cluster randomized clinical trial | 1 | OOHCA | I-Gel VS ETI | Rankin score at DC or 30 days, ventilation success, regurgitation, aspiration |
| Benger JR.(2) | 2016 | EMS | RCT | 1 | OOHCA | I-Gel vs LMA vs ETI | ROSC, Survival to hospital admission and survival to hospital discharge, Survival to 90 |

Table 3: Included study results

| Author | Year | LOE | interventions | Outcomes | Results | #studies | Quality |
|---|---|---|---|---|---|---|---|
| Wang HE.(3) | 2018 | 1 | ETI vs LT | 72 hr survival (Primary) | Significantly favors LT; adjusted risk difference, 2.9% [95% CI, 0.1%- 5.7%]; P = .045) | N/A | Low ROB (Cochrane RoB tool) (23) |
| | | | | ROSC | Significantly favors LT; adjusted risk difference, 3.6% [95% CI, 0.3%-6.8%]; P = .03) | N/A | |
| | | | | Survival to DC | Significantly favors LT; adjusted risk difference, 2.7% [95% CI, 0.6%-4.8%; P = .01), | N/A | |
| | | | | Favorable neurologic status at DC | Significantly favors LT; adjusted risk difference, 2.1% [95% CI, 0.3%-3.8%] P = .02). | N/A | |
| | | | | Adverse events | Favors LT; infrequent overall. AE more prevalent in ETI group except inadequate was higher in LT group compared to ETI (1.8% vs 0.6%). | N/A | |

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|---|---|---|---|---|---|---|---|
| White L.(1) | 2018 | 2 | ETI vs EGD | ROSC | Significantly Favors ETI; OR 1.44; 95%CI [1.27 to 1.63] p value= 0.00001 | 23 studies | GRADE very low quality |
| | | | | Survival to hospital admission | Significantly Favors ETI; OR = 1.36; 95%CI [1.12 -1.66] p value = 0.002 | 14 studies | GRADE very low quality |
| | | | | Survival to hospital discharge | Significantly Favors ETI; OR 1.28; 95%CI [1.02 to 1.60] p value=0.03 | 22 studies | GRADE very low quality |
| | | | | Survival to discharge neurologically intact | No significant difference: OR 1.16; 95%CI [0.94-1.41] p value=0.16 | 14 studies | GRADE very low quality |
| Jensen JL.(5) | 2010 | 2 | ETI vs EGD | Survival | No difference | 2 studies | at least low quality |
| | | | | Neurologic outcomes | No difference | 2 studies | at least low quality |
| | | | | Success rate | No difference | 3 studies | at least low quality |
| | | | | Complications | No difference (hypercapnia/hypoxemia, aspiration) | 2 studies | at least low quality |
| Benger JR.(4) | 2018 | 1 | I-Gel VS ETI | Rankin score at DC or 30 days, ventilation success, regurgitation, aspiration | Included in SR (White et al.) | N/A | N/A |
| Benger J.(2) | 2016 | 1 | I-Gel vs LMA vs ETI | ROSC, Survival to hospital admission and survival to | Included in SR (White et al.) | N/A | N/A |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | hospital discharge, Survival to 90 | | | |

Conclusion:

We report the findings from the best available and most applicable literature for our clinical question. We find one large RCT reporting on ETI vs. LT in OOHCA reporting statistical significance in the risk difference favoring LT for all outcomes. A recent meta-analysis on ETI vs. EGD in OOHCA finds very low-quality evidence favouring ETI for all outcomes except discharge neurologically intact, where there was no statistical difference found. A 2010 systematic review with non-pooled results, report no difference in any outcome between ETI and EDG.

The 2018 pooled analysis of 14 studies found non-significant results (OR 1.16 for ETI; 95%CI [0.94-1.41] p value=0.16) and was deemed to be very low-quality evidence. However, a recent large RCT found a small significant difference favouring LT (adjusted risk difference, 2.1% [95% CI, 0.3%-3.8%] P = .02) this RCT was assessed to be low risk of bias.

The majority of the data was on patients in cardiac arrest limiting the generalizability of our findings to other emergency airway conditions.

Clinical Bottom line:

We find low-quality evidence suggesting there is no compelling evidence favouring either ETI or EGD in OOHCA for any measure including the most clinically meaningful outcome of discharge from hospital neurologically intact.

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