Critically Appraised Topic – Video-assisted laryngoscopy has a greater success rate than direct laryngoscopy.

2820MED – Trauma and Environmental Conditions in Paramedic Practice

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Word Count: 1,300

Clinical Scenario
You are called, code 1, to a residential address for a patient in respiratory distress. On arrival, you meet a middle-aged woman at the front door hysterically telling you her husband cannot breathe. You enter the house and assess the patient is unconscious and not breathing. After several minutes of basic life support you decide to take full control of the airway and insert an endotracheal tube (ETT). It is then that you reach over to grab your laryngoscope to visualize the airway in attempt to insert the ETT.

PICO (Population, Intervention, Comparison, Outcome) Question:
In patients who require endotracheal intubation, will using video laryngoscopy provide a greater rate of success than the standard direct laryngoscope in the prehospital setting.

Search Strategy:
(pre-hospital or prehospital or out-of-hospital or "out of hospital" or paramedic) AND (video-laryngoscopy or "video laryngoscopy") AND (verse or verses or vs) AND (direct-laryngoscopy or "direct laryngoscopy") in Medline OVID

Search Results: 8

Relevant Papers: 6

Author, Date	Population	Design	Outcome	Results	Strengths & Limitations
Ducharme et al, 2017	Total of 82 patients intubated (42 direct laryngoscopy, 40 King video laryngoscopy)	Prospective, randomized trial	Comparison of first-attempt success rates and overall success rates between direct laryngoscopy and King vision laryngoscopy.	First-attempt success showed direct laryngoscopy 28/42, 66.7% vs king vision laryngoscopy 25/40, 62.5%. Overall success rates were direct laryngoscopy 34/42, 81% vs king vision laryngoscopy 29/40, 72.5%	Journal Impact Factor: 4.572 (average citations per article for this journal in 2018) although this impact factor is not spectacular this journal is official journal of the European Resuscitation Council and is considered a highly credible source. (+) study conducted across multiple agencies. (-) small sample size. (-) Did not reach sample number desired.
Kim et al, 2016	140 arrest patients	Prospective randomized	Comparison between direct	Direct laryngoscopy vs	Journal Impact Factor: 4.572.

	intubated by experienced laryngoscopy users (69 direct laryngoscopy, 71 video laryngoscopy)	controlled study	laryngoscopy and video laryngoscopy by ETI success rate, first-attempt success rate, median completion time, and chest compression interruption.	video laryngoscopy ETI success rate 92.8% vs 95.8%, first-attempt success 87.0% vs 94.4%, median completion time 51 seconds vs 42 seconds, chest compression interruption 4 seconds vs no interruption.	(+) excluded ETIs by inexperienced doctors to maintain consistency. (+) Realised that similar studies done previously did not classify based on experience level, thus rectifying this inaccuracy. (+) Although the study is hospital based it has significant potential crossover to prehospital arrest ETI. (+) Authors explain the use cluster randomisation over individual randomisation (-) The article examines intubation within the hospital setting. (-) 28 patients were excluded due to data loss (25) or poor video quality (3).
Trimmel et al, 2016	326 adult emergency patients requiring endotracheal intubation. (168 GlideScope Ranger video laryngoscopy, 158 direct laryngoscopy).	Multicenter, prospective, randomized, controlled trial.	To identify whether the GlideScope Ranger video laryngoscopy can be reliable alternative to the direct laryngoscopy in a prehospital environment.	GlideScope vs direct laryngoscopy success rate was 61.9% (104/168) vs 96.2% (152/158). Failure to advance tube into larynx or trachea was 15.5% (26/168) vs 0% (0/158). Visual impairment caused by blood or fluids 12.5% (21/168) vs 1.9% (3/158). In cases where GlideScope failed,	Journal Impact Factor: 6.971. this shows that articles in this journal are often cited and can be considered high quality sources. (+) Article acknowledges a wide variety of factors influencing successful intubation specific to prehospital care.

				direct laryngoscopy was successful 95.3% (61/64), whereas, when direct laryngoscopy failed, GlideScope succeeded 66.7% (4/6). Impaired GlideScope monitor visualization due to ambient light occurred in 17.3% (29/168) of attempts.	
Aberle et al, 2015	21 post-graduate year 1-3 emergency medicine residents (11 in video laryngoscopy group, two 1st year residents, six 2nd year residents, three 3rd year residents. 10 in the direct laryngoscopy group, five 1st year residents, two 2nd year residents, three 3rd year residents.	Randomised, controlled trial.	To compare the efficiency and perceived ease of use between video laryngoscopy and direct laryngoscopy on training mannequins while wearing hazardous material personal protective equipment.	Mean time to ETI was 10.0 seconds for direct laryngoscopy and 7.8 seconds for video laryngoscopy. Mean time between blade insertion and bag valve mask attachment was 17.4 seconds for direct laryngoscopy and 15.6 seconds for video laryngoscopy. 17 participants (85.0%) perceived video laryngoscopy to be the easier method for ETI while wearing HAZMAT PPE.	Journal Impact Factor: 1.01. this shows the journal is not frequently cited. (-) The incidence rate of intubation during HAZMAT exposure is uncommon. (-) Participants included resident doctors with limited clinical experience. (-) Mannequins were used and not real patients (-) Participants were aware of being observed and data recorded, so there is potential for the Hawthorne effect. (+) Small sample size. (+) Presents an interesting perspective of ease of use while wearing addition personal protective equipment

					(+) shows educational potential for video laryngoscopy.
Jarvis, J., McClure, S., & Johns, D., 2015	514 intubation patients (329 video laryngoscopy. 185 direct laryngoscopy)	Retrospective, observational study.	To assess and compare the first-pass success, overall success and success per attempt rates between video laryngoscopy and direct laryngoscopy	Video laryngoscopy vs direct laryngoscopy overall success 91.5% vs 64.9%, first-pass success 74.2% vs 43.8%, and success per attempt 71.2% vs 44.4%	Journal Impact Factor: 2.557. (+) Large sample size. (+) cross checked compliance of accurate documentation. (+) Multiple skill verification training sessions were conducted prior to study. (-) A retrospective study dissecting charts may skew results based on individual interpretation.
Guyette, Farrell, Carlson, Callaway & Phrampus, 2012	858 adult patients requiring ETI. 348 patients with video laryngoscopy and 510 with direct laryngoscopy.	Non-randomised group-controlled trial.	To identify whether video laryngoscopy reduces the number of intubations attempts while also considering first-pass success.	First-pass success rate was 85.6% for video laryngoscopy vs 86.1% for direct laryngoscopy. Mean number of attempts to intubation were similar: video laryngoscopy 1.17 vs direct laryngoscopy 1.16.	Journal Impact Factor: 2.557. (+) Large sample size. (-) Small practitioner cohort (-) timing direct laryngoscopy milestones with a stopwatch may be inaccurate on a helicopter with a critically ill patient. (-) Article greater than five years old. (-) Non randomised trial.

Comments:

- The potential a visual monitor to be standard practice for performing intubation seems like a natural technological advancement. However, based on evidence reviewed and budget limitations it may take some revision before it is widely implemented.
- The majority of articles reviewed showed slightly improved intubation success and first-pass success in the field. In training simulation however, video laryngoscopy provides an enhanced learning platform for novice technicians.
- Overall, evidence suggests a move towards the use of video laryngoscopy over direct laryngoscopy in the prehospital setting. Further assessment of the clinical benefits against the economic strain is required to identify viability.

Consider: *Should video laryngoscopy be standard practice for prehospital intubations?*

Evidence suggests that video laryngoscopy overall is an improvement on intubation success rates, however, specific randomised, controlled trials with larger population sizes would provide a better statistical picture of the viability of the product. Furthermore, assessing the many variations of video laryngoscopy and assessing superiority amongst them is a further limitation on progressing this technology.

Final Point

The prospect of being able to visualise the airway through a monitor to assist intubation seems intuitive and the evidence, although with its limitations, suggests that the use of video laryngoscopy becomes standard practice for developed emergency medical services worldwide.

Reference List

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