

Paramedic – Evidence Based Medicine (P-EBP) Program

Paramedic CAT (Critically Appraised Topic) Worksheet

Title: Prehospital First-Pass Success Rate of Intubations using Video Laryngoscopy (VL) compared to Direct Laryngoscopy (DL)

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Clinical Scenario:

You arrive on the scene of a house fire as firefighters extract an unresponsive adult patient with a GCS of 3 and evidence of inhalation injury. You make the decision to intubate. Knowing the importance of a successful first pass, you must choose the best approach between direct and video laryngoscopy.

PICO (Population – Intervention – Comparison – Outcome) Question:

P- Patients requiring prehospital intubation

I - Video laryngoscopy

C - Direct laryngoscopy

O - Higher first pass success rates

Search Strategy:



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prehospital patients intubation AND visual laryngoscopy or direct laryngoscopy AND first pass success rate of intubation

Search Outcome:

9 results - PubMed

Relevant Papers:

AUTHOR, DATE	POPULATION: SAMPLE CHARACTERISTICS	DESIGN (LOE)	OUTCOMES	RESULTS	STRENGTHS/ WEAKNESSES
Huebinger, R.R., 2021	Out-of-hospital cardiac arrest patients of at least 18 years old, who were intubated with either DL or VL. The study comprised 22,132 participants.	This study was a retrospective study of a database maintained by the private company ESO Solutions inc. LOE II	1* First Pass Success of intubation. 2* Whether the patient achieved ROSC.	First Pass Success for VL was higher than DL (75.7% vs. 69.5%), 95% CI 4.9%-7.6%, p<.001 ROSC for patients with 1st pass success: 34.7% VL, 34.4% DL. Adjusted OR 1.1 (0.98-1.2), 95% CI ROSC for patients with multiple attempts: 34.8% VL, 34.2% DL Adjusted OR 1.1 (0.99-1.2), 95% CI	Strengths: Large study size Study specific to the pre-hospital environment Diverse cities and systems in Texas; good generalizability Weakness Quality of data limited by reliance on EHS data entry. Non-randomized; selection bias in either patient or provider is possible



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					<p>Rates of bystander CPR varied; possible effects of ROSC statistics</p> <p>Confounding factors linked to intubation success rate not considered</p>
Eberlien, C.M., 2019	<p>Patients who underwent endotracheal intubation, performed by members of a single local ambulance service.</p> <p>The study comprised 296 patients.</p>	<p>This was a retrospective study that reviewed data that had previously been collected in the emergency department.</p> <p>LOE II</p>	1*First pass success of intubation. VL vs DL.	First pass success rate was higher for VL than DL (85.6% vs. 73%; P=.0074)	<p>Strengths:</p> <p>Specific to pre-hospital environment.</p> <p>Included paramedics from various license levels.</p> <p>Weakness:</p> <p>Small study.</p> <p>Self reported results = potential for bias.</p> <p>Could not control for experience.</p> <p>Not randomized. Paramedics could choose preference.</p>



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<p>Savino, P.M et al 2017</p>	<p>A systematic search was performed of Pubmed, Embase, and SCOPUS databases - included studies comparing overall and first-pass success for VL versus DL in patients requiring intubation in the prehospital setting. meta-analysis done using random-effects models.</p> <p>Eight articles were selected</p>	<p>a meta-analysis using a random-effects model.</p> <p>LOE II</p>	<p>Increase rate of first pass success with inexperienced intubators with VL.</p> <p>This increase disappeared with experienced intubators.</p>	<p>First pass for inexperienced intubators (RR= 1.0, 95%, CI = 0.94-1.20)</p> <p>First pass for experienced intubators (RR= 0.34, 95% CI = 0.22 - 0.52).</p>	<p>Strengths:</p> <p>Includes pre-hospital, and not just physician-studied.</p> <p>The 8 articles reviewed here will cause the confidence interval to be narrow, as larger samples equals narrow confidence interval, which gives more precise results.</p> <p>Limitations:</p> <p>The articles encompassed randomized and nonrandomized studies which caused extreme heterogeneity between the studies used in meta-analysis.</p> <p>Varying devices were used (VL).</p> <p>There were a variety of definitions of "first</p>
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					<p>pass success" between studies included in meta-analysis.</p> <p>Not all of the studies included a documented mean number of attempts of intubation.</p> <p>Not generalizable to the general population desired (USA EMS) due to high risk of bias identified with pre-hospital providers. The studies done with physicians were performed outside the USA and may not be generalizable. - low external validity</p>
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Comments:

Studies which included data from both out of hospital physicians and paramedics have a risk of being confounded, as the former group has a higher level of training.

The evidence suggests that there may be a particular advantage to using VL for a less-experienced provider.



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Level of experience of the practitioner is a key determinant of intubation success; those with a large number of intubations are more likely to achieve first-pass success.

Given the improved outcomes using VL over DL in most cases, should paramedics continue to occasionally use DL in situations where VL would also be appropriate, to maintain their skills? This is an interesting ethical dilemma.

Consider:

For patients with poor clinical prognosis, a case can be made for utilizing DL to ensure maintenance of skills. This can cause some ethical challenges regarding our responsibility to provide optimal patient care; however, there is a case to be made based on the evidence that more experienced DL providers are more likely to have success with this technique.

Clinical Bottom Line: VL is associated with a higher first-pass success rate compared to DL in the pre-hospital setting. If we determine that first-pass success is a priority, for example, because it is associated with improved patient outcomes, the evidence suggests that VL should be the intubating technique of choice.

References:

Huebinger, R. M., Stilgenbauer, H., Jarvis, J. L., Ostermayer, D. G., Schulz, K., & Wang, H. E. (2021). Video laryngoscopy for out of hospital cardiac arrest. *Resuscitation*, 162, 143–148. <https://doi.org/10.1016/j.resuscitation.2021.02.031>

Eberlein, C. M., Luther, I. S., Carpenter, T. A., & Ramirez, L. D. (2019). First-pass success intubations using video laryngoscopy versus direct laryngoscopy: A Retrospective Prehospital Ambulance Service Study. *Air Medical Journal*, 38(5), 356–358. <https://doi.org/10.1016/j.amj.2019.06.004>



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Savino, P. B., Reichelderfer, S., Mercer, M. P., Wang, R. C., & Sporer, K. A. (2017). Direct versus video laryngoscopy for prehospital intubation: A systematic review and meta-analysis. *Academic Emergency Medicine*, 24(8), 1018–1026. <https://doi.org/10.1111/acem.13193>



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