

# Adaptation of Airway Performance Methods in the Emergency Department and Overall First-Pass Success

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## BACKGROUND

- Endotracheal intubation is a critical emergency procedure where first pass success (FPS) reduces adverse events, morbidity, and mortality (1).
- FPS reflects procedural skill and is associated with fewer complications (hypoxemia, hemodynamic instability, airway trauma) (2).
- Intrinsic factors influencing FPS: technique, device choice, bougie use, induction agents, and patient anatomy (3, 4, 5, 6).
- Extrinsic factors influencing FPS: checklist use, structured documentation, quality improvement (QI) initiatives (7, 8, 9).
- Effective airway QI includes an airway lead, structured programs, standardization, simulation-based training, performance monitoring, and multidisciplinary collaboration, all contributing to measurable outcome improvements (10).

## AIM

- The effect of airway quality improvement programs on endotracheal intubations in the emergency department (ED).

## METHODS

- A multifaceted airway quality improvement (QI) initiative was implemented over 18 months, beginning before December 2018, with an inflection point in January 2019.
- Key components included establishing a QI program, appointing an airway lead, introducing a pre-intubation checklist (Fig. 1), a failsafe algorithm (Fig. 2), structured debriefings, and monthly education.
- Real-time data were collected during intubations by the lead RN using a standardized checklist.
- Completed debrief forms were stored in the ED and retrieved every 48 hours for secure spreadsheet entry.
- Outcomes compared pre- and post-Jan 2019 included: FPS, difficult airway identification, cricothyrotomy, desaturation, vomiting after medications, peri-intubation cardiac arrest, completed airway documentation, and bougie use.
- Chi-squared analysis was used to assess differences in outcomes, with significance set at  $p < 0.05$  shown in Table 1
- Forest Plot of odds ratio and confidence interval shown in Figure 3.

- Physio Issues (HOp) Considered
- Induction Agent/Muscle Relaxant
- Post-Tube Analgesia/Sedation
- ± Push-Dose Epi
- Confirm: 3 laryngoscopies, SGA, Cric?
- Cric Evaluation

- Denitrogenated ≥ 3 minutes
- ApOx with NC @20
- Oxygenated 100% (or add CPAP)
- Look in Mouth - Dentures - Range Neck
- Positioning
- Pulse Ox Visible & not on BP arm
- Access - Reliable & Tested

- Equipment on Large Table
- BVM + PEEP Valve on Flush-Rate O<sub>2</sub>
- Waveform Capnograph on BVM
- Video Laryngoscope
- Bougie, SGA, Scalpel in Room
- Suction x2
- Eye/Face Protection
- Press Record

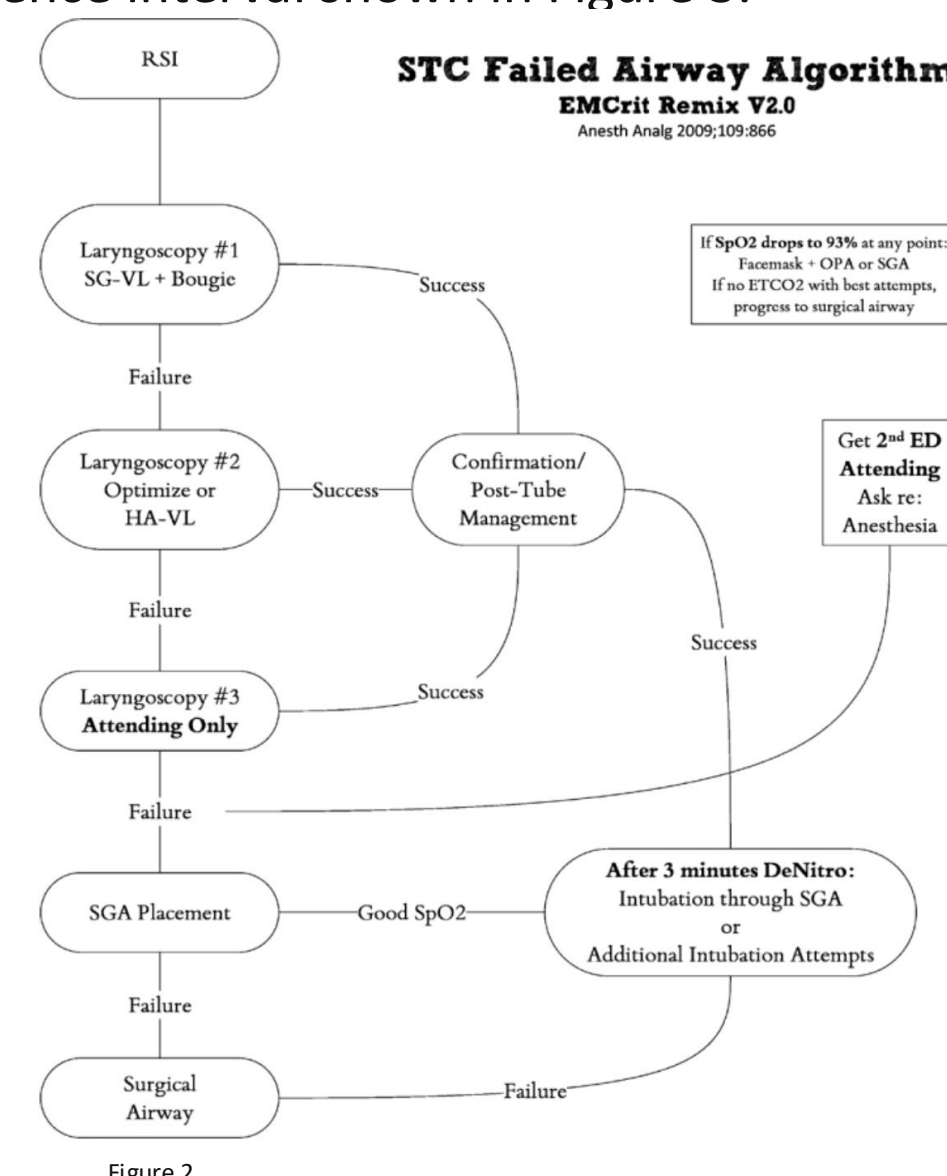


Figure 1

Figure 2

## RESULTS

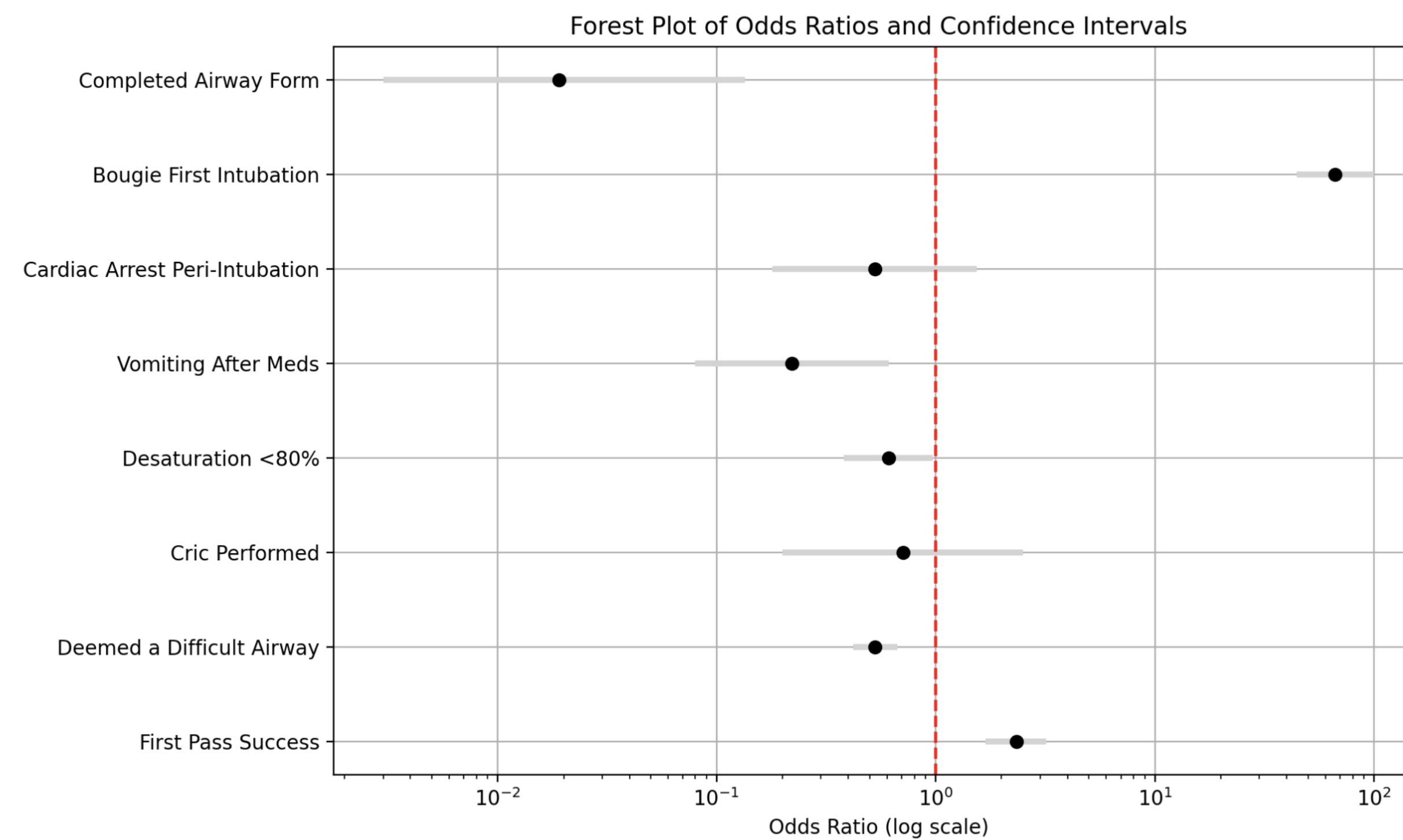


Figure 3

Outcome Measure	Pre 2019 (n = 389)	Post Jan. 2019 (n = 2202)	p-value
<b>FPS of Endotracheal Intubation</b>	329/389 84.58%	2042/2202 92.73%	<b>1.03E-07</b>
<b>Was This Deemed a Difficult Airway?</b>	145/389 37.28%	529/2202 24.02%	<b>3.97E-08</b>
<b>Was a Surgical Cricothyrotomy Performed?</b>	3/389 0.77%	12/2202 0.54%	<b>0.588</b>
<b>Was There a Desat. &lt;80% With a Good Waveform? *</b>	24/389 6.17%	85/2202 3.86%	<b>0.036</b>
<b>Was there Vomiting after RSI Meds? *</b>	7/389 1.80%	9/2202 0.41%	<b>0.001</b>
<b>Was there a Cardiac Arrest After Intubation Meds? **</b>	5/389 1.29%	11/2202 0.50%	<b>0.245</b>
<b>Was this a Bougie First Intubation?</b>	26/389 6.68%	1819/2202 82.61%	<b>3.81E-204</b>
<b>Was the Airway Form Filled Out?</b>	388/389 99.74%	1939/2202 88.06%	<b>2.15E-12</b>

\* Excludes patients in cardiac arrest at the time of intubation  
\*\* or within 10 minutes post-intubation

Table 1

## LIMITATIONS

- Inconsistent data collection prior to 2019
- Single-center study design
- Impact of the COVID-19 pandemic – The onset of the COVID-19 pandemic introduced substantial changes in clinical workflows and disrupted standard data collection processes

## DISCUSSION

- The implementation of a high-quality airway management program can significantly enhance resuscitative efforts during emergent airway situations in the ED.
- Key components—such as early and structured resident education, continuous quality improvement initiatives, standardized pre-intubation checklists, failsafe planning, and multidisciplinary post-intubation debriefings—collectively contribute to improved first-pass intubation success rates and a reduction in peri-intubation complications.
- These findings highlight the importance of a systematic, team-based approach to airway management in high-acuity settings (v).

## CONCLUSIONS

- Implementation of a high-quality airway management program led to significant improvements in multiple key performance indicators for ED intubations. Notably, there was a significant increase in FPS (OR=2.33, 95% CI: 1.69–3.20) and bougie-first intubations (OR=66.37, 95% CI: 44.27–100.26), reflecting both improved procedural success and adherence to evidence-based technique.
- The program was associated with a reduction in the proportion of airways deemed difficult (OR=0.53, 95% CI: 0.42–0.67), as well as statistically significant decreases in desaturation <80% and vomiting after medication administration.
- No statistically significant changes were observed in rates of cricothyrotomy or peri-intubation cardiac arrest, likely due to low overall event frequencies.
- These findings support the effectiveness of structured airway management initiatives in improving patient safety, procedural outcomes and improved first pass success in high-acuity settings.
- Future research should focus on expanding the dataset, refining quality improvement strategies, and exploring multicenter studies incorporating standardized airway education, intubation checklists, and system-wide performance tracking.

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