Fiber-Optic Illusions: Can Video Laryngoscopy Offset Interruptions in Compressions?

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University of Utah School of Medicine
He Loved Bacon

Oh, and his wife and kids too.
### Adverse Effects?

#### Endotracheal intubation vs bag-valve-mask ventilation

<table>
<thead>
<tr>
<th>Model</th>
<th>Total No. of Patients</th>
<th>Endotracheal Intubation</th>
<th>Bag-Valve-Mask Ventilation</th>
<th>Odds Ratio (95% CI)(^a)</th>
<th>Favors Bag-Valve-Mask Ventilation</th>
<th>Favors Endotracheal Intubation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>26,013 (7.3)</td>
<td>17,34 (6.7)</td>
<td>14,824 (8.3)</td>
<td>0.76 (0.71-0.81)</td>
<td></td>
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</tr>
<tr>
<td>Return of spontaneous circulation</td>
<td>17,8614 (50.0)</td>
<td></td>
<td></td>
<td>0.66 (0.61-0.72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>357,228</td>
<td></td>
<td></td>
<td>0.64 (0.58-0.70)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted for selected variables(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted for all variables(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1-month survival</td>
<td>357,228</td>
<td>10,69 (4.1)</td>
<td>10,373 (5.8)</td>
<td>0.70 (0.65-0.76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td></td>
<td></td>
<td></td>
<td>0.87 (0.79-0.97)</td>
<td></td>
<td></td>
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<tr>
<td>Adjusted for selected variables(^b)</td>
<td></td>
<td></td>
<td></td>
<td>0.88 (0.79-0.98)</td>
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<tr>
<td>Adjusted for all variables(^c)</td>
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<td></td>
</tr>
<tr>
<td>Neurologically favorable survival</td>
<td>357,228</td>
<td>257 (1.0)</td>
<td>5,799 (3.2)</td>
<td>0.31 (0.27-0.35)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td></td>
<td></td>
<td></td>
<td>0.45 (0.37-0.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted for selected variables(^b)</td>
<td></td>
<td></td>
<td></td>
<td>0.42 (0.34-0.53)</td>
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<td></td>
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<tr>
<td>Adjusted for all variables(^c)</td>
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<td></td>
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</tr>
</tbody>
</table>

\(^a\) Odds ratio with 95% confidence intervals

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**Prepare**  •  **Respond**  •  **Impact**
Advanced Airway Placement

Excessive Ventilation
- Vasoconstriction
- Increased Intrathoracic Pressure
- Esophageal Intubations

Interruptions in Compressions
- Increased Ischemia

Selection Bias

Functional Survival

Prepare  ·  Respond  ·  Impact
Advanced Airway Placement

- Excessive Ventilation
  - Vasoconstriction
  - Increased Intrathoracic Pressure
    - Esophageal Intubations

- Interruptions in Compressions

- Selection Bias

Increased Ischemia

Functional Survival

Prepare • Respond • Impact
Prepare    •    Respond    •    Impact
Shock Summary

Depth (in)

Compression Quality

Rate (cpm)

Prepare • Respond • Impact
Preferred First Line Airway

King LT
Nov 2011

DL
May 2012

VL
Jul 2013

Prepare • Respond • Impact
538 Resuscitation Attempts

- 141 data deleted or not recorded
- 23 with <5 min CPR
- 14 intubated but unknown if DL or VL
- 12 Pediatric arrests
- 7 intubated after ROSC
- 5 Corrupted files

336 Analyzed

No Advanced Airway
N=23

King LT
N=43

Direct Laryngoscopy
N=145

Video Laryngoscopy
N=125

Prepare • Respond • Impact
First Attempt Success

- VL (N=133): 66.9%
- DL (N=152): 70.4%
- King LT (N=47): 76.6%

p > 0.05
Number of Attempts Until Success or Abandonment

- King LT: 4
- DL: 3
- VL: 2

p > 0.05
## CPR Metrics

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Rate (cpm)</th>
<th>Depth (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (n=23)</td>
<td></td>
<td>112</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(105-121)</td>
<td>(1.7-2.4)</td>
</tr>
<tr>
<td>King LT (n=43)</td>
<td></td>
<td>118</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(111-125)</td>
<td>(1.9-2.4)</td>
</tr>
<tr>
<td>DL (n=145)</td>
<td></td>
<td>114</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(106-124)</td>
<td>(1.9-2.4)</td>
</tr>
<tr>
<td>VL (n=125)</td>
<td></td>
<td>111</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(106-116)</td>
<td>(2.0-2.4)</td>
</tr>
<tr>
<td></td>
<td>CCF</td>
<td>Longest Pause</td>
<td>Pauses &gt;10 sec</td>
</tr>
<tr>
<td>----------------</td>
<td>-------</td>
<td>---------------</td>
<td>----------------</td>
</tr>
<tr>
<td>None (N=23)</td>
<td>92 (86-95)</td>
<td>18 (11-33)</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>King LT (N=43)</td>
<td>92 (90-95)</td>
<td>29 (15-65)</td>
<td>2 (1-3)</td>
</tr>
<tr>
<td>DL (N=145)</td>
<td>92 (90-94)</td>
<td>26 (12-59)</td>
<td>2 (1-4)</td>
</tr>
<tr>
<td>VL (N=125)</td>
<td>92 (90-95)</td>
<td>22 (14-41)</td>
<td>2 (1-3)</td>
</tr>
</tbody>
</table>

CPR Interruptions
Utstein Survival

Witnessed with Shockable Initial Rhythm

Survival to Hospital Discharge

Year


32% 30% 29% 39% 46% 48% 60%

Prepare • Respond • Impact
### Influence of Advanced Airways on Survival

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Unadjusted Relative Risk</th>
<th>(95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endotracheal Intubation</td>
<td>0.21</td>
<td>(0.13-0.35)</td>
</tr>
</tbody>
</table>

p<0.0001
Endotracheal Intubation\hline
0.76 (0.45-1.3)\
\hline

\textit{p=0.31}

Adjusted for age, gender, witnessed, ems witnessed, shockable initial rhythm, shocked by PAD, public location, early ROSC, number of epi doses
Ease of Getting a Grade 1 View of the Glottis

- Very Easy
- Easy
- Neither Easy nor ...
- Difficult
- Very Difficult

Prepare  •  Respond  •  Impact
Ease of Passing the Tube

- Very Easy
- Easy
- Neither Easy nor ...
- Difficult
- Very Difficult

Prepare • Respond • Impact
Can Video Laryngoscopy Offset Interruptions in Compressions?

Not in a system where CPR quality is closely monitored
Monitoring CPR quality is more important for achieving quality CPR than is the choice of airway.
The adverse effects of intubation on survival are probably largely due to selection bias.
Summary

Like MDs, paramedics find obtaining a view with video laryngoscopy is easier than passing the tube.