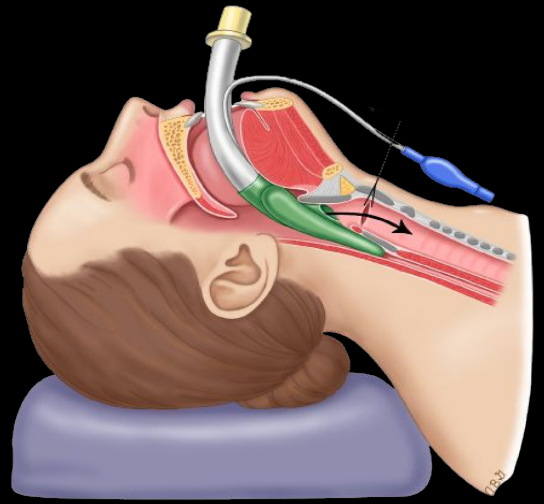
# Are SUPRA-glottic airways all that SUPER?



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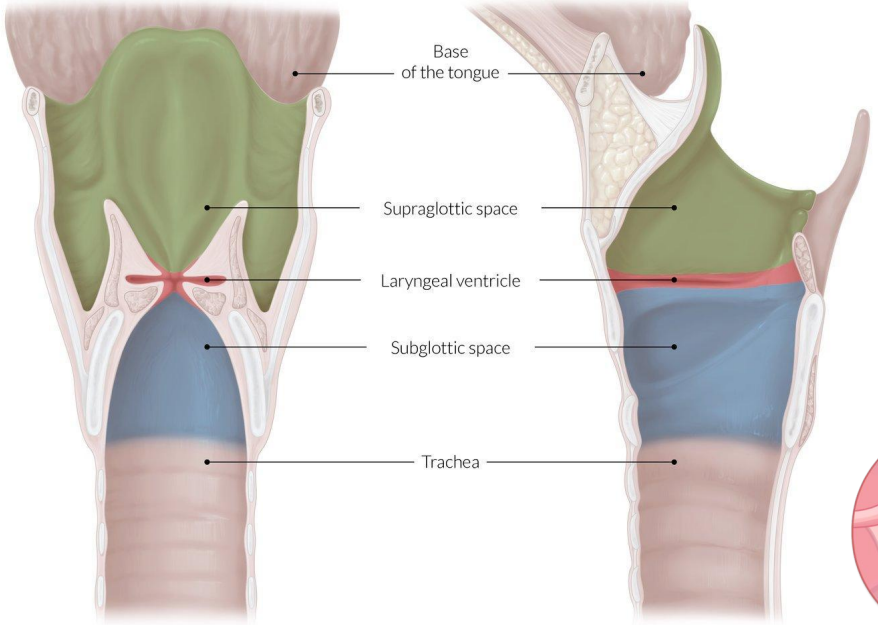
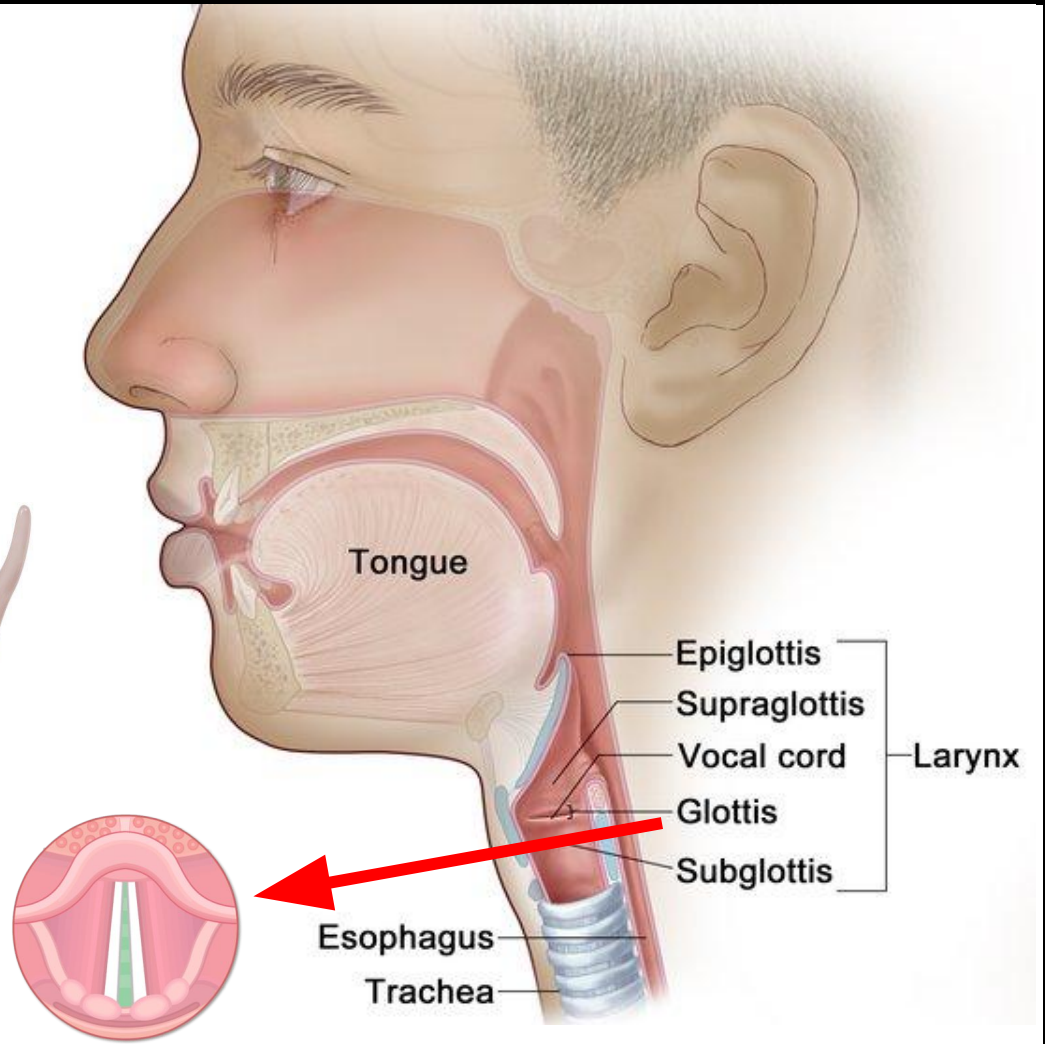
Michelle Safferman

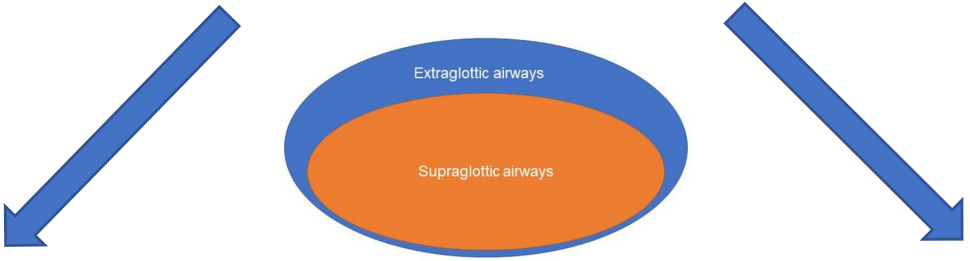
UCSD EMS/Disaster Medicine Fellow

# ANATOMY REVIEW

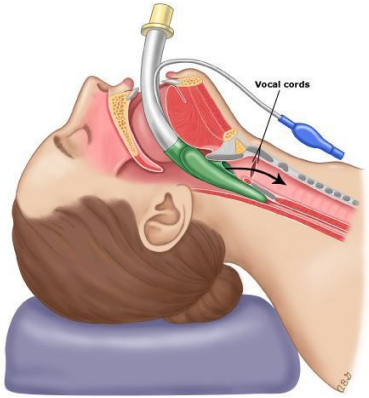


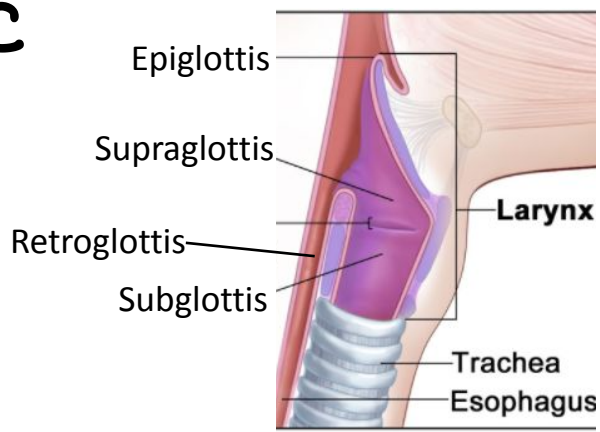



# EXTRAGLOTTIC AIRWAYS

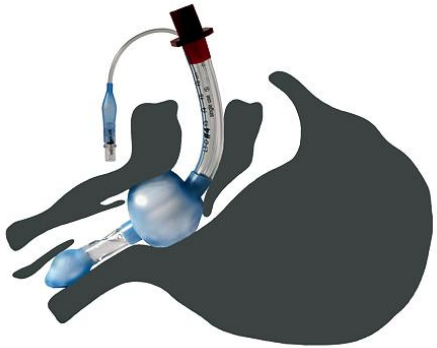



## SUPRAGLOTTIC




## RETROGLOTTIC



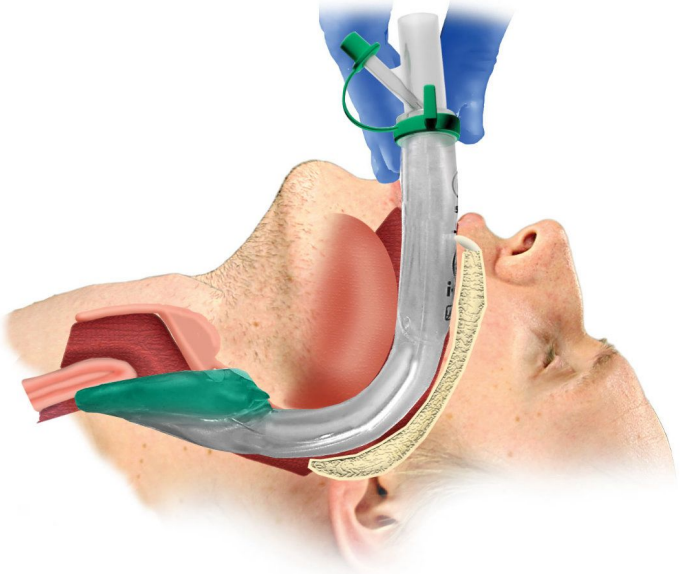
# Cook Classification

1st gen

2nd gen

3rd gen

# EXTRAGLOTTIC AIRWAYS

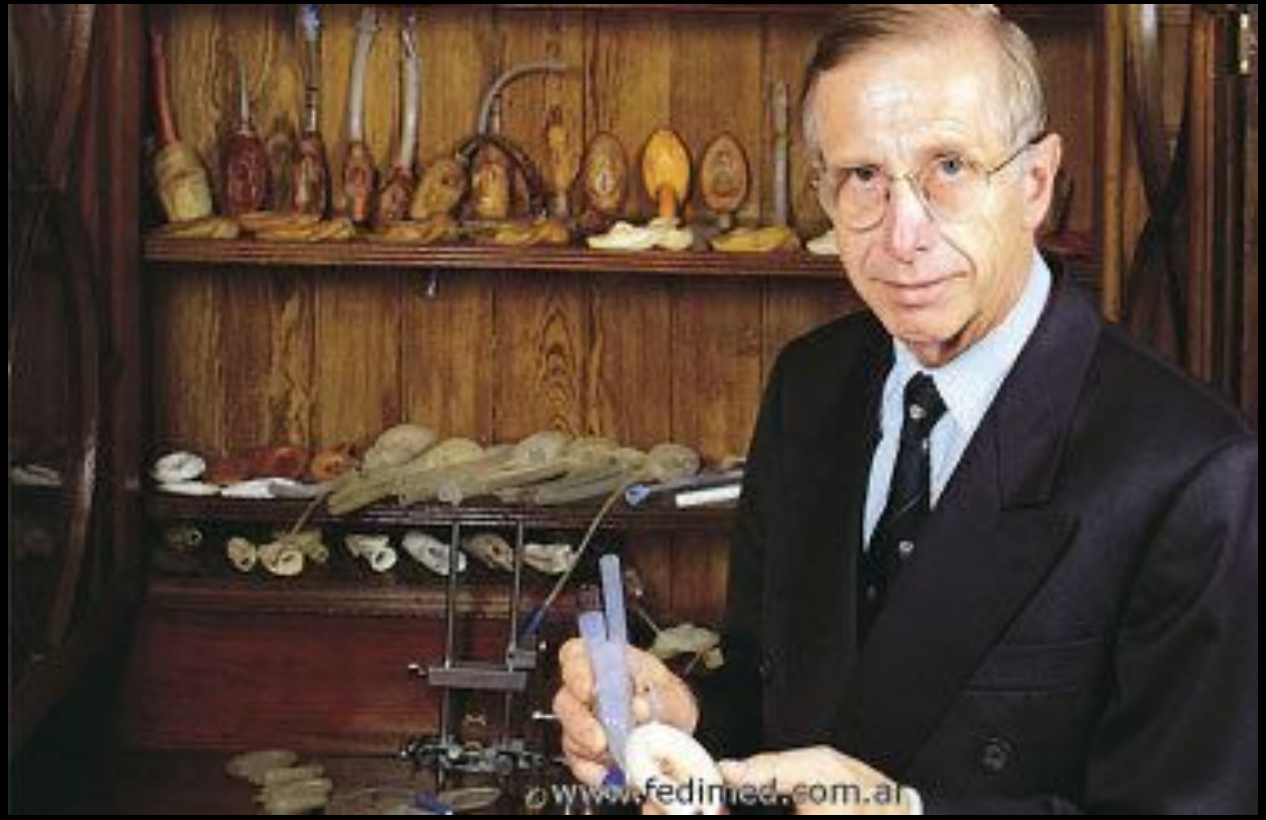


# Terminology

SUPRAGLOTTIC AIRWAY = PERILARYNGEAL AIRWAY ADJUNCT

LARYNGEAL TUBE

EXTRAGLOTTIC AIRWAY = LARYNGEAL MASK AIRWAY (LMA)


©www.fedimed.com.ar


how equipment works .com

# Features of an Ideal SGA

1. Easy to place - does not require inflation
2. Provides effective oxygenation and ventilation
3. Allows for:
   - Gastric decompression
   - Tracheal intubation

## Features of common extraglottic devices (EGDs)

| Device | Glottic location | Ability to pass OG tube | Ability to intubate blindly |
|---|---|---|---|
| LMA Classic | Supraglottic (laryngeal mask) | No (1st generation EGD) | Yes (variable success)[1,2] |
| LMA ProSeal | Supraglottic (laryngeal mask) | Yes (2nd generation EGD) | No |
| LMA Supreme | Supraglottic (laryngeal mask) | Yes (2nd generation EGD) | No |
| LMA Fastrach | Supraglottic (laryngeal mask) | No (1st generation EGD) | Yes (good success)[3-13] |
| Aura-i | Supraglottic (laryngeal mask) | No (1st generation EGD) | Yes (limited data) |
| Aura-Gain | Supraglottic (laryngeal mask) | Yes (2nd generation EGD) | Yes (limited data) |
| Air-Q | Supraglottic (laryngeal mask) | Yes (only blocker version) | Yes (good success)[11-14] |
| i-Gel | Supraglottic (laryngeal mask) | Yes (2nd generation EGD) | Yes (variable success)[5,6] |
| Combitube | Retroglottic (laryngeal tube) | Yes (2nd generation EGD) | No |
| King LT | Retroglottic (laryngeal tube) | Yes (only LTS version) | No |

*Courtesy of Erik Laurin, MD, and Aaron Bair, MD.*

# SAN DIEGO COUNTY BLS

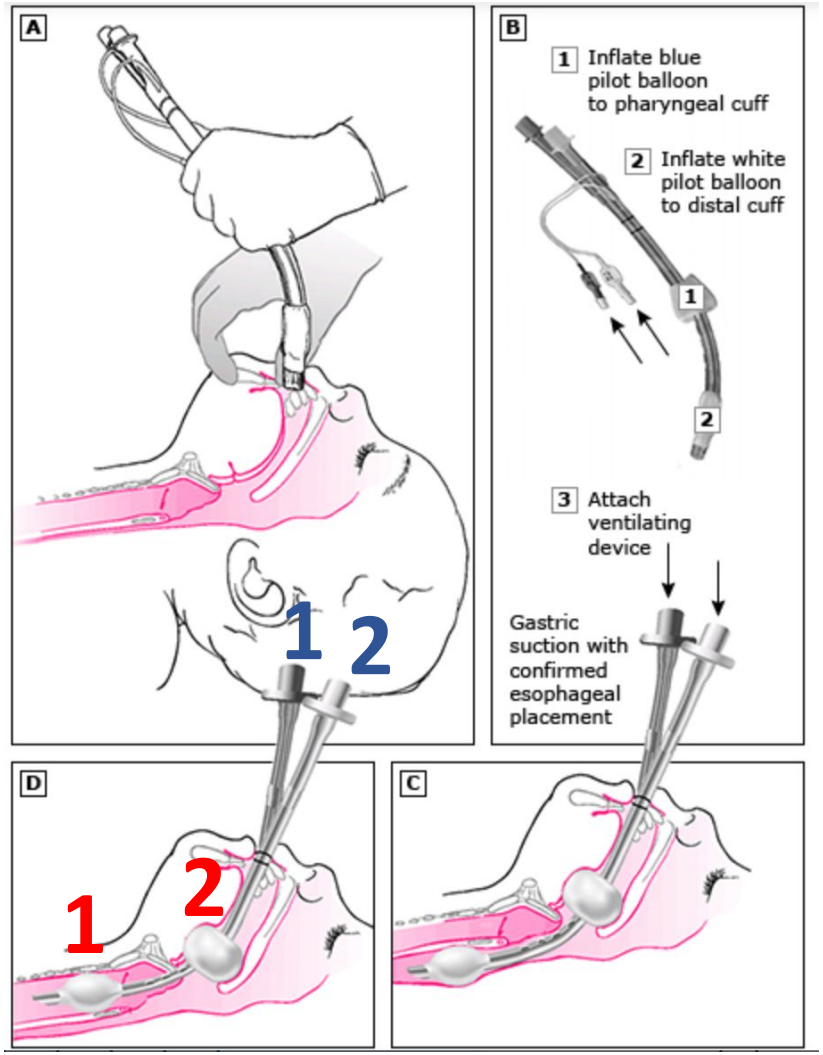
| BLS Requirements | Minimum Requirements |
|---|---|
| Automated External Defibrillator<br>(Automated External Defibrillator not required for ALS) | 1 |
| Ambulance cot and collapsible stretcher – clean, mattress intact, and in good working order | 1 each |
| Straps to secure the patient to the cot or stretcher | 1 set |
| Ankle and wrist restraints | 1 set |
| Linens (sheets, pillow, pillowcase, blanket, towels) | 2 sets |
| Personal protective equipment (masks, gloves, gowns, shields) | 2 sets |
| Oropharyngeal airways | - |
| • Adult | 2 |
| • Pediatric 0-5 | 1 each |
| • Neonate | 1 |
| • Premature | 1 |
| Pneumatic or rigid splints | 4 |
| Bag-valve-mask w/reservoir and clear resuscitation mask | - |
| • Adult | 1 |
| • Pediatric | 1 |
| • Neonate | 1 |
| • Premature | 1 |

# SAN DIEGO COUNTY ALS

| A. Airway Adjuncts | Minimum Requirements |
|---|---|
| Quantitative end tidal $CO_2$ monitor | 1 |
| *Pediatric end tidal $CO_2$ detection device (if capnography not equipped to read $EtCO_2$ in patients weighing <15kgs)* | 2 |
| CPAP equipment | 1 |
| Endotracheal tubes | - |
| • *5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0 (cuffed)* | 1 each |
| Esophageal tracheal double lumen airway (kit) | - |
| • Combitube: Small adult | 1 |
| **OR** | - |
| Laryngeal/tracheal airway (King Airway: sizes 3, 4, 5) | 1 each |
| ET adapter (nebulizer) | 1 setup |
| Laryngoscope – handle | 2 |
| Laryngoscope – blade | - |
| • *Straight sizes 0-4* | 1 each |
| • Curved sizes 2-4 | 1 each |
| Magill tonsil forceps – small and large | 1 each |
| Stylet – 6 and 14 french, Adult | 1 each |
| Bougie | 1 each |
| HEPA/viral filter (for BVM, CPAP, nebulizer) | 6 |

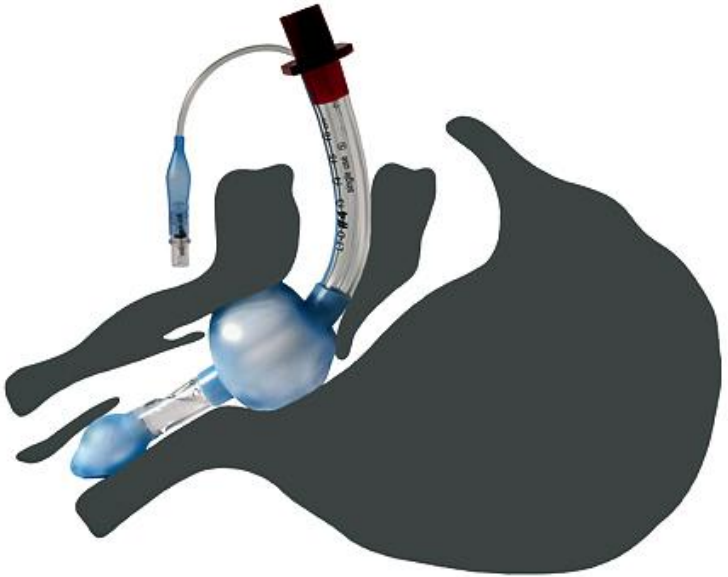
# Combitube

- Dual-lumen
- Dual-cuff
- Designed for esophageal placement
- Definitive airway can not be established through it



# King Laryngeal Tube (LT)

- Dual-cuff
- Single large lumen
- Single inflation valve
- Shorter
- Definitive airway can (kind of) be established through it



**State of California**
**Title 22, Division 9:Prehospital Emergency Medical Servises**

**Regulations in Effect as of July 1, 2021**

**Emergency Medical Services Authority**
**Health and Human Services Agency**


# § 100146. Scope of Practice of Paramedic.

(D) Perform pulmonary ventilation by use of lower airway multi-lumen adjuncts, the esophageal airway, perilaryngeal airways, stomal intubation, and adult oral endotracheal intubation.

Randomized Controlled Trial > Prehosp Emerg Care. 2018 May-Jun;22(3):385-389.
doi: 10.1080/10903127.2017.1399183. Epub 2018 Jan 24.

# Comparison Of The I-Gel Supraglottic And King Laryngotracheal Airways In A Simulated Tactical Environment

Juan A March, Theresa E Tassey, Noel B Resurreccion, Roberto C Portela, Stephen E Taylor

- Prospective randomized cross over trial
- Basic EMT level participants
- Time to successful placement:
  - King = 39.7s
  - i-gel = 14.4
- 100% preferred i-gel > King

**Takeaway: i-gel fastest to place & preferred**

Randomized Controlled Trial > Prehosp Emerg Care. 2018 May-Jun;22(3):385-389.
doi: 10.1080/10903127.2017.1399183. Epub 2018 Jan 24.

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**Takeaway: i-gel fastest to place & preferred**

# Emergency airway management by paramedics

## comparison between standard endotracheal intubation, laryngeal mask airway, and I-gel

Leventis, Charalampos; Chalkias, Athanasios; Sampanis, Michail A.; Foulidou, Xanthipi; Xanthos, Theodoros

Author Information

*European Journal of Emergency Medicine* 21(5):p 371-373, October 2014. | **DOI:** 10.1097/MEJ.0000000000000101

- 72 paramedics
- Investigated successful manikin model placement of:
  - ETI
  - LMA
  - i-gel
- Success rate: i-gel > LMA > ETI
- Insertion time shorter for i-gel > LMA + ETI

**Takeaway: i-gel most successfully placed and fastest**

Prehospital care

# Assessment of the speed and ease of insertion of three supraglottic airway devices by paramedics: a manikin study

Nick Castle [3], Robert Owen [1], Mark Hann [2], Raveen Naidoo [3], David Reeves [2]

Correspondence to Nick Castle, Department of EMC & R, Durban University of Technology, South African and Emergency Department, Frimley Park Hospital, Portsmouth Road, Camberley, Surrey, UK; Nicholas.castle@ntlworld.com

- 36 paramedic students timed on insertion of i-gel, LMA, LTA on manikin
- i-gel consistently fastest (12.3s) vs. LTA (22s) and LMA (33.8s)
- 63% preferred i-gel citing:
  - Ease of use
  - Speed of insertion

**Takeaway: i-gel fastest to place & preferred**

**Clinical Study | Open Access**
Volume 2015 | Article ID 201898 | https://doi.org/10.1155/2015/201898

Show citation

# Comparison of Five 2nd-Generation Supraglottic Airway Devices for Airway Management Performed by Novice Military Operators

**Tomas Henlin**,[1] Michal Sotak,[1] Petr Kovaricek,[1] Tomas Tyll,[1] Lukas Balcarek,[1] and Pavel Michalek [2,3]

Show more

| Device | First-attempt success rate | | | |
|---|---|---|---|---|
| | Successful | Unsuccessful | Total | (%) |
| PLMA | 85 | 16 | 101 | 84.2 |
| SLMA | 97 | 5 | 102 | 95.1 |
| i-gel | 87 | 13 | 100 | 87.0 |
| SLIPA | 66 | 34 | 100 | 66.0 |
| LTS-D | 79 | 23 | 102 | 77.5 |

- Simulated field experience with non-experienced military personnel
- Most suitable devices = Supreme LMA & i-gel
  - High FPS rate
  - Faster insertion times
  - Deemed “most east to insert”

**Takeaway: LMA Supreme & i-gel fastest, easiest, and most successful**

Anaesthesia
Peri-operative medicine, critical care and pain
Association of Anaesthetists

Free Access

# Evaluation of four airway training manikins as patient simulators for the insertion of eight types of supraglottic airway devices*

K. M. Jackson, T. M. Cook

First published: 21 March 2007 | https://doi.org/10.1111/j.1365-2044.2007.04983.x | Citations: 106

"i-gel significantly the easiest"

Anaesthesia 2014, 69, 1151–1162 doi:10.1111/anae.12772

Review Article

# A systematic review and meta-analysis of the i-gel® vs laryngeal mask airway in adults*

J. de Montblanc, L. Ruscio, J. X. Mazoit and D. Benhamou

- 31 randomized controlled trials
- All participants undergoing elective surgery
- i-gel reduced:
  - Time to insertion
  - Rate of post-op sore throat
  - Rate of poor fibreoptic view through the airway
- No difference in rate of insertion on first attempt

**Takeaway: i-gel fastest, both LMA & i-gel easy to insert**

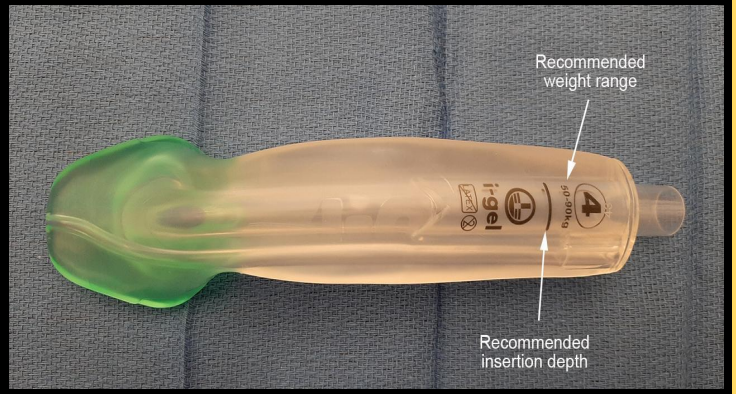
Should SGA devices (specifically the i-gel) be adopted for San Diego County paramedic adult airway management?

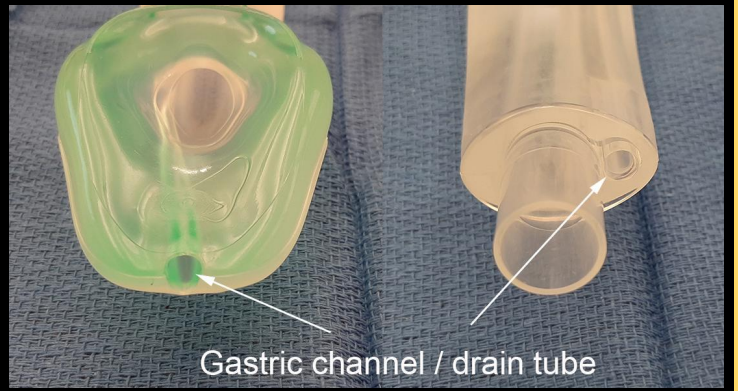
# Summary & Recommendation

- i-gel is consistently one of the fastest EGA devices regarding insertion time
- Preferred device by prehospital providers for ease of insertion
- **Reasonable to add to the list for San Diego County**

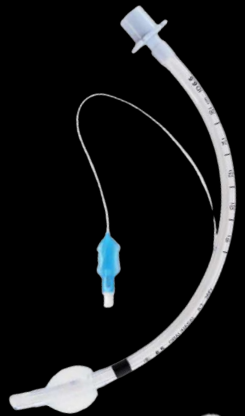
# i-gel

- Second generation SGA
- Made from thermoplastic elastomer (PVC and latex free)
- Non-inflating cuff
- Integrated bite block
- Gastric channel/drain

# Out of Hospital Cardiac Arrest



## BLS

- Continuous compressions of 100-120/min with ventilation rate of 10-12/min
- Use metronome or other real-time audiovisual feedback device
- Rotate compressor at least every 2 min
- Use mechanical compression device (unless contraindicated)
- $O_2$ and/or ventilate with BVM
- Monitor $O_2$ saturation
- Apply AED during CPR and analyze as soon as ready

**VAD**

- Perform CPR
- Contact BH for additional instructions

## ALS

- Apply defibrillator pads during CPR. Defibrillate immediately for VF/pulseless VT.
- IV/IO SO
- Capnography SO with waveform and value
- ET/PAA SO without interrupting compressions
- NG/OG tube PRN SO
- Provide cardiac monitor data to agency QA/QI department

**Team leader priorities**

- Monitor CPR quality, rate, depth, full chest recoil, and capnography value and waveform
- Minimize interruption of compressions (<5 sec) during EKG rhythm checks
- Charge monitor prior to rhythm checks. Do not interrupt CPR while charging.

An endotracheal tube has long been considered the gold-standard for airway management during resuscitation.

10-15 seconds

SELECTED TOPICS: PREHOSPITAL CARE | VOLUME 44, ISSUE 2, P389-397,
FEBRUARY 01, 2013

# Comparison of Neurological Outcome between Tracheal Intubation and Supraglottic Airway Device Insertion of Out-of-hospital Cardiac Arrest Patients: A Nationwide, Population-based, Observational Study

Seizan Tanabe, MD • Toshio Ogawa, MSc • Manabu Akahane, MD, PhD • ... Tetsuo Hatanaka, MD, PhD • Hiroyuki Yokota, MD, PhD • Tomoaki Imamura, MD, PhD • Show all authors

- Categorized patients into 3 groups: LMA, ETI, EOA
- Significantly higher rates 1-month survival in ETI group
- Neurologic outcomes poor across the board
- Pitfalls:
  - Classified by device in use on arrival at the hospital
  - Only small subgroup of experienced providers allowed to intubate

**Takeaway: bad outcomes everywhere, slightly worse with EGA>ETI**

# How many attempts are required to accomplish out-of-hospital endotracheal intubation?

Henry E Wang [1], Donald M Yealy

Affiliations + expand

PMID: 16531595 DOI: 10.1197/j.aem.2005.11.001

Free article

## Abstract

**Background:** An important goal of emergency airway management is to complete endotr
intubation (ETI) correctly, s
morbidity and mortality. Clin
but this strategy also may r

**Objectives:** To characterize
and ETI success.

**Methods:** This study used
agencies from an 18-month
and physicians) completed
course, and outcomes for a
blade. Rescuers identified E

# Emergency tracheal intubation: complications associated with repeated laryngoscopic attempts

Thomas C Mort [1]

Affiliations + expand

PMID: 15271750 DOI: 10.1213/01.ANE.0000122825.04923.15

## Abstract

bation attempts may contribute to patient morbidity. Critically-
n cardiovascular, pulmonary, metabolic, neurologic, or trauma-
nto an emergency intubation quality improvement database.
d for airway and hemodynamic-related complications based on
correlated to the number of attempts required to successfully
erating room. There was a significant increase in the rate of
number of laryngoscopic attempts increased (</=2 versus >2
70%), regurgitation of gastric contents (1.9% versus 22%),
versus 13%) bradycardia (1.6% versus 21%), and cardiac arrest
ugh predictable, this analysis provides data that confirm the
s associated with the incidence of airway and hemodynamic
the recommendation of the ASA Task Force on the
to limit laryngoscopic attempts to three in lieu of the
occur.

# The importance of first pass success when performing orotracheal intubation in the emergency department

John C Sakles [1], Stephen Chiu, Jarrod Mosier, Corrine Walker, Uwe Stolz

Affiliations + expand

PMID: 23574475 PMCID: PMC4530518 DOI: 10.1111/acem.12055

Free PMC article

## Abstract

**Objectives:** The goal of this study was to determine the association of first pass success with the incidence of adverse events (AEs) during emergency department (ED) intubations.

**Methods:** This was a retrospective analysis of prospectively collected continuous quality improvement data based on orotracheal intubations performed in an academic ED over a 4-year period. Following each intubation, the operator completed a data form regarding multiple aspects of the intubation, including patient and operator characteristics, method of intubation, device used, the number of attempts required, and AEs. Numerous AEs were tracked and included events such as witnessed aspiration, oxygen desaturation, esophageal intubation, hypotension, dysrhythmia, and cardiac arrest. Multivariable logistic regression was used to assess the relationship between

JAMA | Original Investigation

# Effect of a Strategy of Initial Laryngeal Tube Insertion vs Endotracheal Intubation on 72-Hour Survival in Adults With Out-of-Hospital Cardiac Arrest

## A Randomized Clinical Trial

Henry E. Wang, MD, MS; Robert H. Schmicker, MS; Mohamud R. Daya, MD, MS; Shannon W. Stephens, EMT-P; Ahamed H. Idris, MD; Jestin N. Carlson, MD, MS; M. Riccardo Colella, DO, MPH; Heather Herren, MPH, RN; Matthew Hansen, MD, MCR; Neal J. Richmond, MD; Juan Carlos J. Puyana, BA; Tom P. Aufderheide, MD, MS; Randal E. Gray, MEd, NREMT-P; Pamela C. Gray, NREMT-P; Mike Verkest, AAS, EMT-P; Pamela C. Owens; Ashley M. Brienza, BS; Kenneth J. Sternig, MS-EHS, BSN, NRP; Susanne J. May, PhD; George R. Sopko, MD, MPH; Myron L. Weisfeldt, MD; Graham Nichol, MD, MPH

- 3000 OHCA
- Initial LT placement (vs. ETI) associated with greater 72-hour survival
- Similar procedural duration
- LT required fewer insertion attempts

**Takeaway: LT faster, more efficient & showed better survival at 72h than ETI**

Research

JAMA | Original Investigation

# Effect of a Strategy of a Supraglottic Airway Device vs Tracheal Intubation During Out-of-Hospital Cardiac Arrest on Functional Outcome

## The AIRWAYS-2 Randomized Clinical Trial

Jonathan R. Benger, MD; Kim Kirby, MRes; Sarah Black, DClinRes; Stephen J. Brett, MD; Madeleine Clout, BSc; Michelle J. Lazaroo, MSc; Jerry P. Nolan, MBChB; Barnaby C. Reeves, DPhil; Maria Robinson, MOst; Lauren J. Scott, MSc; Helena Smartt, PhD; Adrian South, BSc (Hons); Elizabeth A. Stokes, DPhil; Jodi Taylor, PhD; Matthew Thomas, MBChB; Sarah Voss, PhD; Sarah Wordsworth, PhD; Chris A. Rogers, PhD

- 9296 OHCA in the UK
- No difference in primary outcome of hospital survival with favorable neurologic outcome in ETI vs. i-gel
- Initial ventilation success significantly better in i–gel group

**Takeaway: i-gel faster but no difference in good neuro outcome in ETI or i-gel**

JAMA | Original Investigation

# Effect of Bag-Mask Ventilation vs Endotracheal Intubation During Cardiopulmonary Resuscitation on Neurological Outcome After Out-of-Hospital Cardiorespiratory Arrest

## A Randomized Clinical Trial

Patricia Jabre, MD, PhD; Andrea Penaloza, MD, PhD; David Pinero, MD; Francois-Xavier Duchateau, MD; Stephen W. Borron, MD, MS; Francois Javaudin, MD; Olivier Richard, MD; Diane de Longueville, MD; Guillem Bouilleau, MD; Marie-Laure Devaud, MD; Matthieu Heidet, MD, MPH; Caroline Lejeune, MD; Sophie Fauroux, MD; Jean-Luc Greingor, MD; Alessandro Manara, MD; Jean-Christophe Hubert, MD; Bertrand Guihard, MD; Olivier Vermylen, MD; Pascale Lievens, MD; Yannick Auffret, MD; Celine Maisondieu, MD; Stephanie Huet, MD; Benoît Claessens, MD; Frederic Lapostolle, MD, PhD; Nicolas Javaud, MD, PhD; Paul-Georges Reuter, MD, MS; Elinor Baker, MD; Eric Vicaut, MD, PhD; Frédéric Adnet, MD, PhD

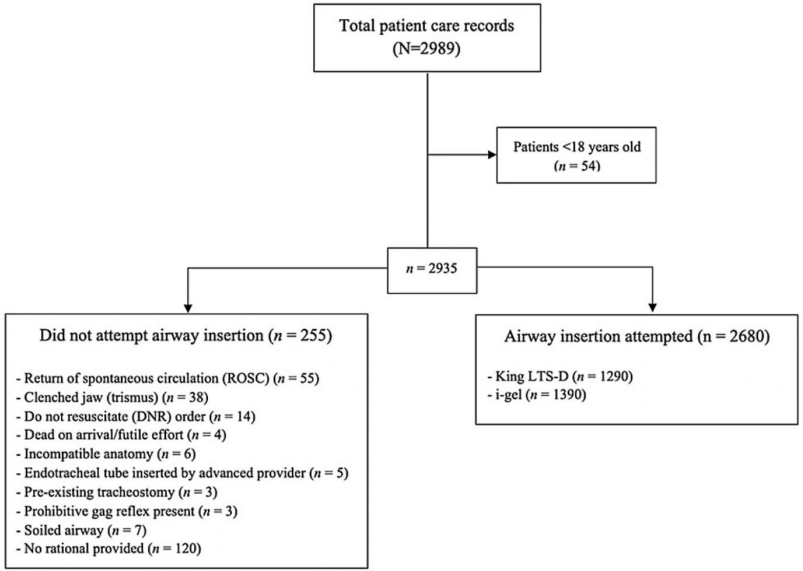
- 2000 patients received ETI or BMV
- No differences in survival to hospital admission or 28-day survival
- BVM showed slightly higher 28-day favorable neurologic status over ETI

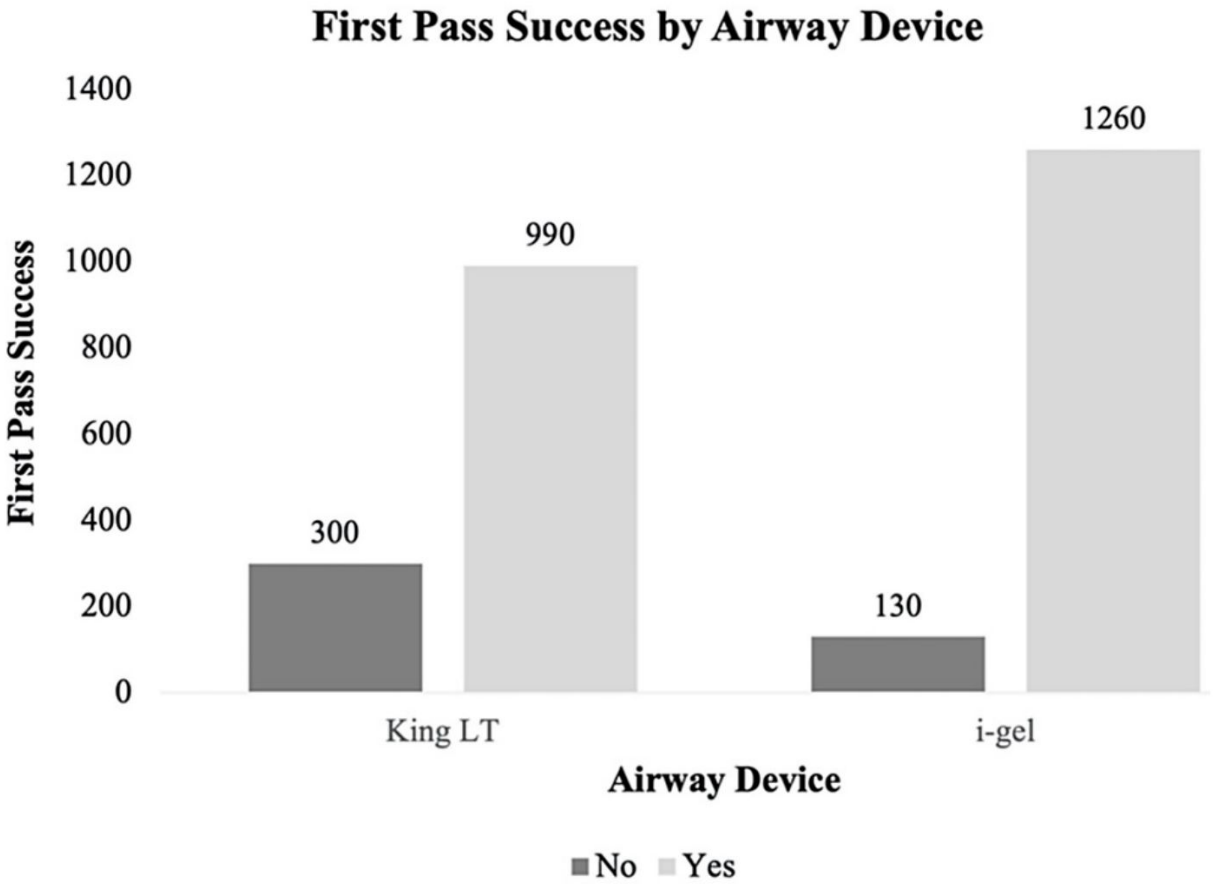
**Takeaway: BMV is not worse than ETI for survival, slightly better neuro outcome**

# Comparing the First-Pass Success Rate of the King LTS-D and the i-gel Airway Devices in Out-of-Hospital Cardiac Arrest

Patrick Price [1], Anne Laurie [2], Eric Plant [1], Kavish Chandra [3], Tushar Pishe [4], Keith Brunt [1]

1. Medicine, Dalhousie Medicine New Brunswick, Saint John, CAN 2. Education, Concordia University, Montreal, CAN 3. Emergency Medicine, Dalhousie University, Halifax, CAN 4. Emergency Medicine, Saint John Regional Hospital/Horizon Health Network, Saint John, CAN





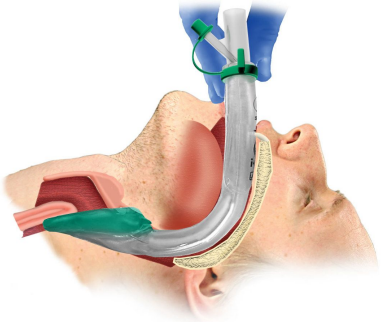

First pass success rate:

- King LTS-D = 76.7%
- i-gel = 90.6%

| Number of Attempts[a] | King LTS-D (Total %) | i-gel (Total %) |
|---|---|---|
| 1 | 990 (88.6%) | 1,260 (93.5%) |
| 2 | 100 (9.0%) | 75 (5.6%) |
| 3 | 23 (2.1%) | 12 (0.9%) |
| 4 | 3 (0.3%) | 0 (0%) |
| 5 | 1 (0.1%) | 0 (0%) |
| Total N | 1117 | 1,347 |

**TABLE 2: Number of attempts to successful insertion per supraglottic airway**

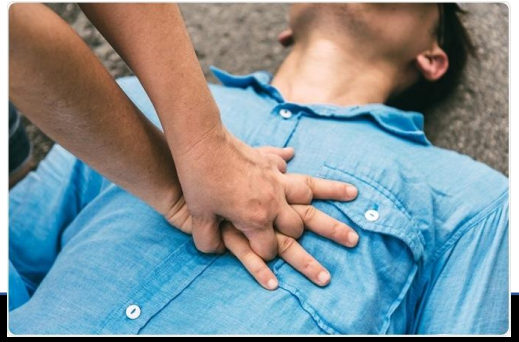
VS.



VS.

- These studies are some of the <u>best evidence available to date</u> regarding advanced airway management in adult OHCA
- A lot of the older data is poor
- **None indicate <u>clinical advantages</u> for ETI over SGA or BMV**

American Heart Association®



High quality CPR is the primary component influencing survival from cardiac arrest.

# EGA & Cerebral Perfusion Pressure

- Very well done study
- 3 different SGAs used in cardiac arrest significantly decreased cerebral blood flow in pigs
- Reason to believe humans may be different

ELSEVIER

Resuscitation

Volume 83, Issue 8, August 2012, Pages 1025-1030


Experimental paper

## Impairment of carotid artery blood flow by supraglottic airway use in a swine model of cardiac arrest ☆

Nicolas Segal [a] ✉, Demetris Yannopoulos [b] ✉, Brian D. Mahoney [c] ✉, Ralph J. Frascone [d] ✉, Timothy Matsuura [e] ✉, Colin G. Cowles [e] ✉, Scott H. McKnite [e] ✉, David G. Chase [f] ✉

# Summary:

| SGA Primary | SGA Secondary |
| --- | --- |
| • Higher FPS rate than intubation<br>  • CPR<br>  • Intubating condition/location<br>  • Less experienced provider<br>• Less interruptions to CPR | • ETI gold-standard<br>• Maintaining intubation skill<br>• EGA may affect CPP |

**Recommendation:** Reasonable to allow 1 attempt (< 15s) for ETI. If unsuccessful, move to i-gel.

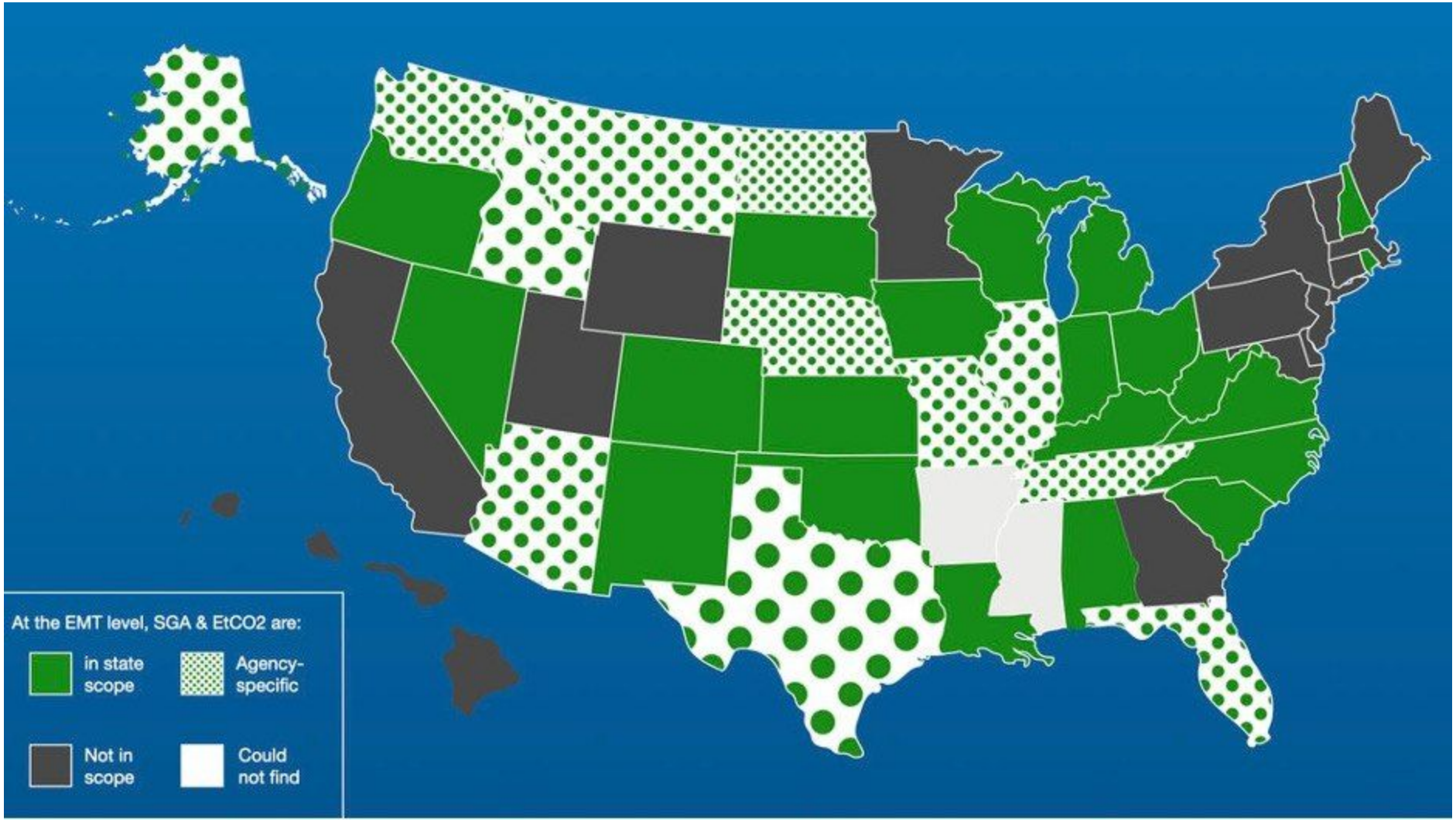
# Is there a recommendation for EMT use of SGAs?

# 2019 Scope of Practice on SGA

- Extensively debated
- Discussion focused on:
  - Ease of the skill
  - Need for waveform capnography to confirm placement
  - Need for additional education and training

**I. Skill – Airway/Ventilation/Oxygenation**

| I. Skill – Airway / Ventilation / Oxygenation | EMR | EMT | AEMT | Paramedic |
|---|---|---|---|---|
| Airway – nasal | | X | X | X |
| Airway – oral | X | X | X | X |
| Airway – supraglottic | | | X | X |
| Bag-valve-mask (BVM) | X | X | X | X |
| CPAP | | X | X | X |


At the EMT level, SGA & EtCO2 are:
in state scope
Agency-specific
Not in scope
Could not find

# BMV

- Difficulty of this skill well documented in the literature
- 2 people needed
- Challenges include:
  - Controlling rate
  - Controlling volume
  - Maintaining mask seal
  - Stomach insufflation
  - Lack of airway protection

# Advantages as EMT Skill

- Above literature highlights high FPS rate even in novices
- Allows paramedics to focus on other aspects of resuscitation (esp. in cardiac arrest)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WestJEM
Integrating Emergency Care With Population Health

West J Emerg Med. 2020 May; 21(3): 688–693.
Published online 2020 Apr 16. doi: 10.5811/westjem.2020.3.45844
PMCID: PMC7234713
PMID: 32421521

# Efficacy of Laryngeal Tube versus Bag Mask Ventilation by Inexperienced Providers

Danielle Hart, MD, MACM,[✉] Brian Driver, MD, Gautham Kartha, MD, Robert Reardon, MD, and James Miner, MD

- 20 medical students and first-year emergency med residents (inexperienced)
- 1200 breaths measured, 600 per technique (LT vs. BMV)
- Able to provide higher ventilation volumes and peak pressures with LT when compared to BMV

**Takeaway: Better ventilation achieved with LT > BMV**

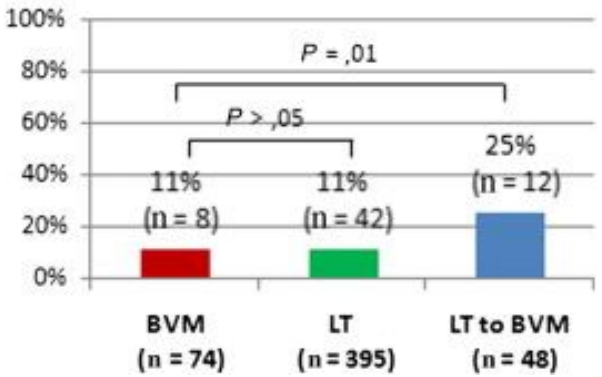
The American Journal of Emergency Medicine
Volume 33, Issue 8, August 2015, Pages 1050-1055

Original Contribution

# Safety and Feasibility of the Laryngeal Tube When Used by EMTs During Out-of-Hospital Cardiac Arrest ☆

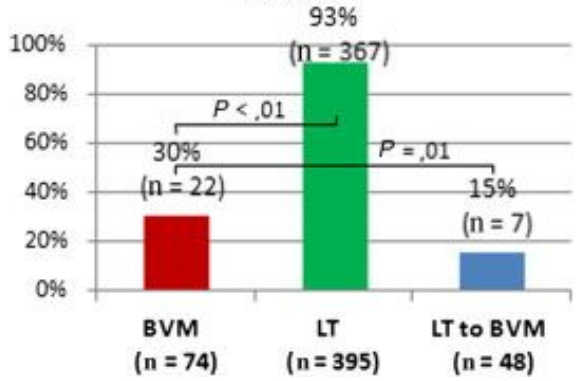
Dominik Roth MD [a], Christina Hafner MD [a, b], Werner Aufmesser MD [c], Kurt Hudabiunigg MD [c], Christian Wutti MD [c], Harald Herkner MD, MSc [a], Wolfgang Schreiber MD [a, c]

## Complications




- Prospective, multicenter observational cohort study - Austrian EMTs
- Compared safety and feasibility
- 517 cases: 395 with LT, 74 with BVM
- Compared to BVM, LT success rates were significantly higher

## Success




**Takeaway: LT = more successful ventilation**

# EMT-led laryngeal tube vs. face-mask ventilation during cardiopulmonary resuscitation - a multicenter prospective randomized trial

Anna Fiala, Wolfgang Lederer, Agnes Neumayr, Tamara Egger, Sabrina Neururer, Ernst Toferer, Michael Baubin & Peter Paal

*Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* **25**, Article number: 104

- 97 OHCA
  - 46 LT
  - 51 BMV
- EMTs preferred LT > BMV ventilation in pre-study training BUT
- No difference in ease of handling and efficacy, frequency of complications and outcomes between LT and BMV in actual cases

**Takeaway: No real difference between LT and BMV**

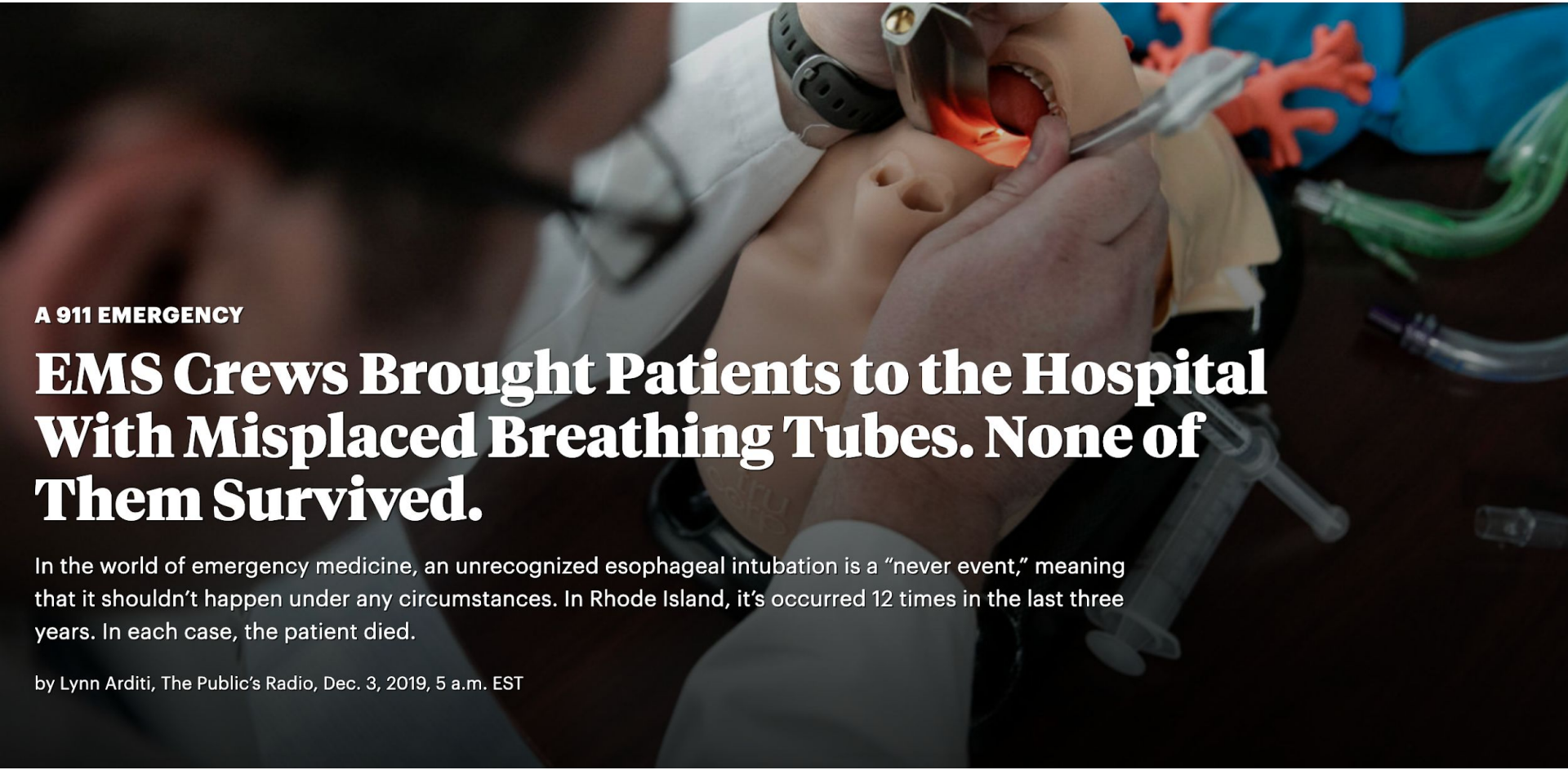
Most important step regardless of type of advanced airway used is confirming appropriate placement with waveform capnography.

# Unrecognized failed airway management using a supraglottic airway device

Veer D. Vithalani, MD • Sabrina Vlk, MS CCRC LP • Steven Q. Davis, MD MS LP • Neal J. Richmond, MD

Published: July 24, 2017 • DOI: https://doi.org/10.1016/j.resuscitation.2017.07.019 • 

- Retrospective review
- Patients underwent airway management using King LTS-D
- 344 reviewed
- 13.8% were misplaced but unrecognized by EMS provider



A 911 EMERGENCY

# EMS Crews Brought Patients to the Hospital With Misplaced Breathing Tubes. None of Them Survived.

In the world of emergency medicine, an unrecognized esophageal intubation is a “never event,” meaning that it shouldn’t happen under any circumstances. In Rhode Island, it’s occurred 12 times in the last three years. In each case, the patient died.

by Lynn Arditi, The Public’s Radio, Dec. 3, 2019, 5 a.m. EST

# EMT-B Training

- Average training program in the US 120-150 hours of training
- Learning the skill alone is not enough
  - Clinical judgement
  - Troubleshooting


## Paramedic

| | | | |
|---|---|---|---|
| End tidal $CO_2$ Detection Device (Qualitative) | All intubated patients <15 kg - unless quantitative end tidal $CO_2$ available for patient <15 kg. | None | Continuous monitoring after ET/ETAD/PAA insertion required. |
| End tidal $CO_2$ Detection Device – Capnography (Quantitative) | All intubated patients<br><br>Respiratory distress or cardiovascular impairment<br><br>Trauma | None | Continuous monitoring after ET/ETAD/PAA insertion required.<br><br>Use early in cardiac arrest.<br><br>For $EtCO_2$ > 0 mmHg, may place ET/PAA without interrupting compressions.<br><br>If $EtCO_2$ rises rapidly during CPR, pause CPR and check for pulse.<br><br>If quantitative is unavailable due to special circumstances, then use qualitative (optional equipment) |

**EMTs in San Diego County do not currently have any end-tidal CO2 monitoring skills or equipment**

# Pros & Cons for EMT SGA Use

## Pros

- Another skill/tool in the toolbox for airway management
- SGA is easier than BMV in many patients
- Enables medics to work on other aspects of resuscitation

## Cons

- More training needed (in an already tight curriculum)
- May not be as necessary in San Diego given transport times usually short

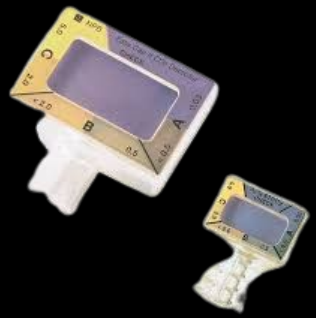
# Recommendations

- Start with implementation of i-gel for paramedics in San Diego County
- Consider future local optional scope for EMTs
- Must be implemented alongside waveform capnography

# Pediatric EMS Airway Management

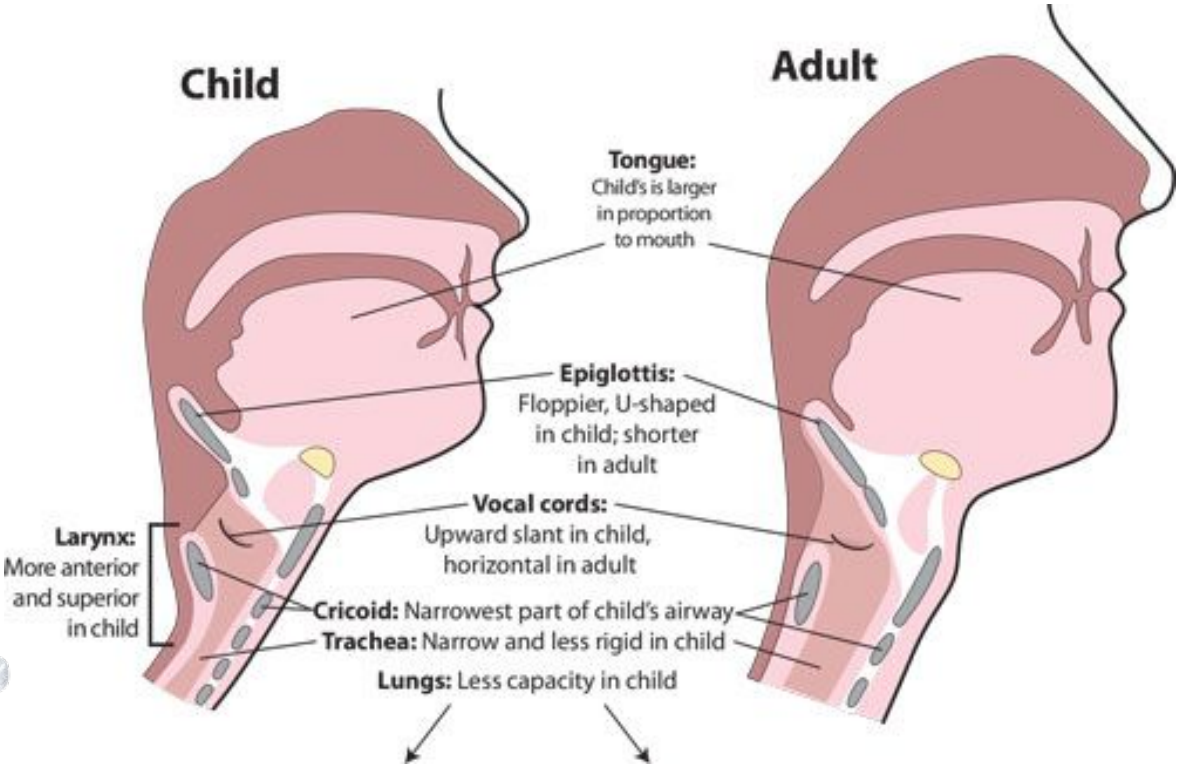
# BLS/ALS AMBULANCE INVENTORY

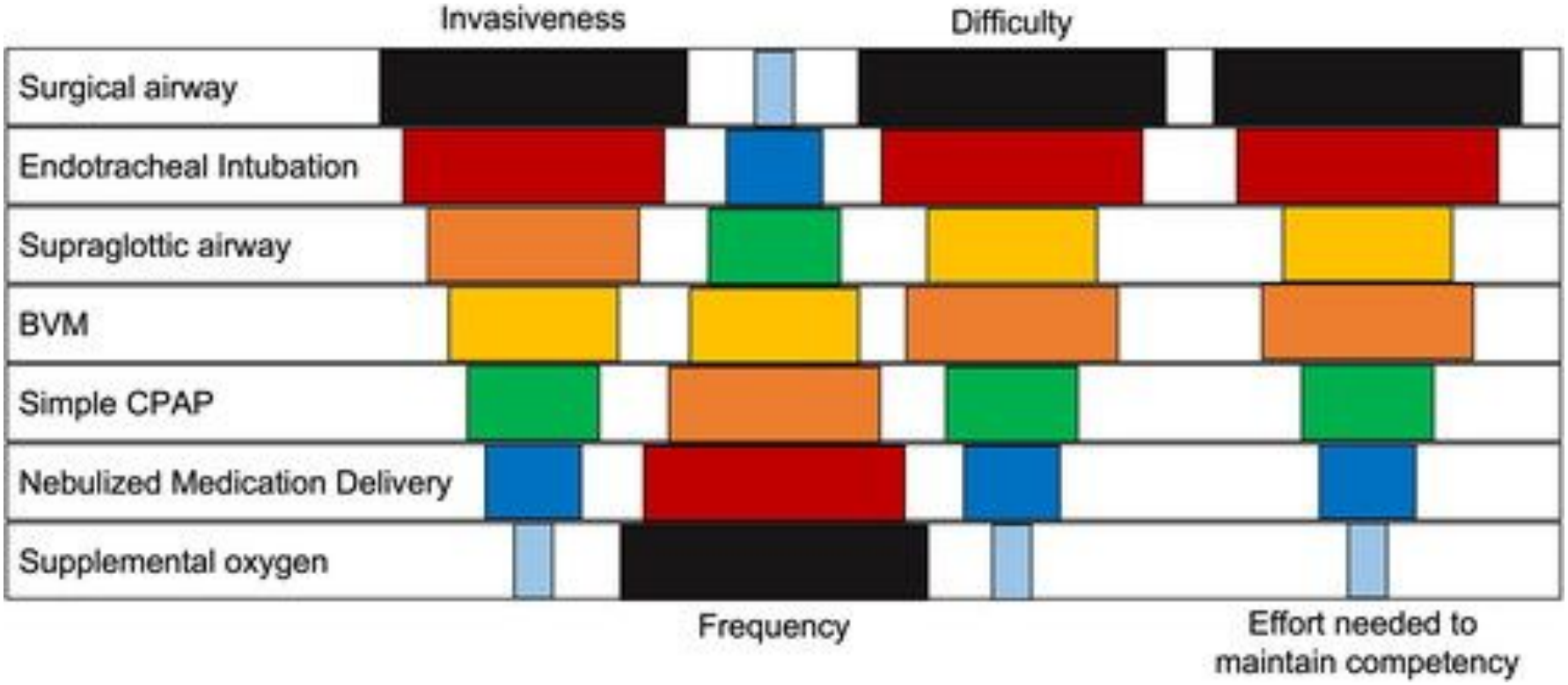




# Pediatric airways are not just small adult airways






Invasiveness
Difficulty
Surgical airway
Endotracheal Intubation
Supraglottic airway
BVM
Simple CPAP
Nebulized Medication Delivery
Supplemental oxygen
Frequency
Effort needed to maintain competency

# Does the literature support EGA use in Pediatric patients, particularly when there are no other advanced airway options?

NAEMSP Prehospital Airway Position Papers

# Prehospital Pediatric Respiratory Distress and Airway Management Interventions: An NAEMSP Position Statement and Resource Document

**Matthew Harris**, John W. Lyng, Maria Mandt, Brian Moore, Toni Gross, Marianne Gausche-Hill & J. Joelle Donofrio-Odmann ...show less

Pages 118-128 | Received 14 Aug 2021, Accepted 13 Oct 2021, Published online: 10 Jan 2022

# Comparison of Direct Laryngoscopy to Pediatric King LT-D in Simulated Airways

Byars, Donald V. MD[*†]; Brodsky, Richard A. MD[‡]; Evans, David MD[*]; Lo, Bruce MD[*§]; Guins, Theresa MD[‡]; Perkins, Amy M. MS[‖]

Author Information

*Pediatric Emergency Care* 28(8):p 750-752, August 2012. | **DOI:** 10.1097/PEC.0b013e3182624a28

- 37 paramedics in 2 simulation-based identical clinical scenarios
  - Laryngoscopy supplies
  - Pedi-King airway
- Significant improvement of ventilation time (~102s ) in King group

**Takeaway: King airway significantly faster than ETI**

# A comparison of pediatric airway management techniques during out-of-hospital cardiac arrest using the CARES database

Matthew L. Hansen • Amber Lin • Carl Eriksson • ... Dana Zive • Craig Newgard • the CARES surveillance group • Show all authors

Published: August 22, 2017 • DOI: https://doi.org/10.1016/j.resuscitation.2017.08.015 • 

- 1724 OHCA cases analyzed from 405 EMS agencies
  - 45% BVM
  - 42% ETI
  - 13% SGA
- BMV associated with higher survival to hospital discharge

**Takeaway: Higher survival to hospital discharge, may be biased data**

# Prospective evaluation of airway management in pediatric out-of-hospital cardiac arrest

Matt Hansen • Henry Wang • Nancy Le • ... Joshua Kornegay • Robert Schmicker • Mohamud Daya •
Show all authors

Published: August 11, 2020 • DOI: https://doi.org/10.1016/j.resuscitation.2020.08.003 • 

- Prospective observational study 155 pediatric OHCA
- 3 airway management strategies studied: ETI, SGA, BMV
  - No difference in time to initial dose of epinephrine
  - Time to first successful airway significantly shorter with SGA
  - First attempt success: ETI 59%, SGA 95%
- Lower rates of pneumonia in BMV only group (higher in SGA, ETI)

**Takeaway: SGA fastest and most successful, BMV lowest PNA rates**

# Advanced airway interventions for paediatric cardiac arrest: A systematic review and meta-analysis

Eric J. Lavonas [a, b], Shinichiro Ohshimo [c], Kevin Nation [d], Patrick Van de Voorde [e, f], Gabrielle Nuthall [g], Ian Maconochie [h], Nazi Torabi [i], Laurie J. Morrison [j, k]

on behalf of the International Liaison Committee on Resuscitation (ILCOR) Pediatric Life Support Task Force

- Meta-analysis, mostly OHCA
- Overall certainty of evidence: **low to very low**
- Better outcomes with BMV > ETI or SGA
    - Survival to hospital discharge
    - Survival to hospital discharge with good neuro outcome

**Takeaway: ETI or SGA are not superior to BMV**

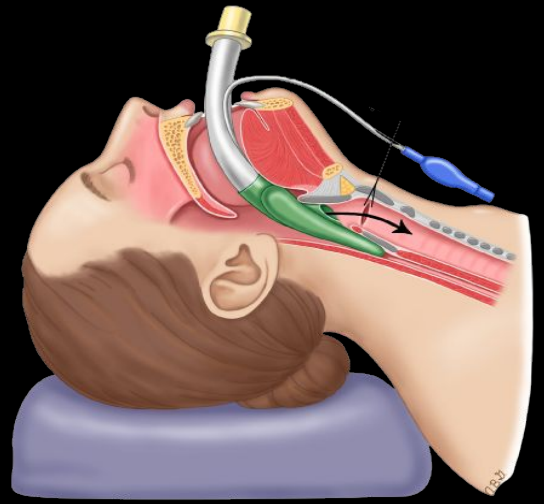
# Pediatric SGA Summary

- When comparing SGA with ETI in pediatric OHCA, SGA is favored for multiple reasons
- Neither SGA or ETI has proven superior to BMV in pediatrics

# Recommendation

- Consider including training on pediatric i-gel placement when implementing adult i-gel placement in SD County
- BMV can still be first line however it is reasonable to have i-gel in the toolkit

# Are SUPRA-glottic airways all that SUPER?



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YES!

# THANKS FOR LISTENING!

# QUESTIONS & DISCUSSION

Special thanks to Dr. Duncan for reviewing my slides

# References


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