**Clinical question.**

In adult cardiac arrest (prehospital [OHCA], in-hospital [IHCA]) (P), does the use of a supraglottic airway device (I) vs an endotracheal tube (I), improve any outcomes (O)."

**Is this question addressing an intervention/therapy, prognosis or diagnosis?** intervention

**State if this is a proposed new topic or revision of existing worksheet:** new

**Conflict of interest specific to this question**

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? no

**Search strategy (including electronic databases searched).**

Pubmed: laryngeal mask [MESH] and heart arrest [MESH] or cardiopulmonary resuscitation [MESH]; intubation and cardiac arrest or cardiopulmonary resuscitation [MESH] or CPR; supraglottic airway and cardiac arrest or heart arrest [MESH] or cardiopulmonary resuscitation [MESH] or CPR; LMA and cardiac arrest or cardiopulmonary resuscitation [MESH] or heart arrest [MESH] or CPR; airway and cardiac arrest or CPR or cardiopulmonary resuscitation [MESH] or heart arrest [MESH]

Neonatal resuscitation and laryngeal mask [MESH] or supraglottic airway

Cochrane library: intubation and cardiac arrest; airway and cardiac arrest; supraglottic airway and cardiac arrest; LMA and cardiac arrest

Embase: Cardiopulmonary resuscitation (CPR) and airway; CPR and intubation; CPR and supraglottic airway; CPR and LMA

Endnote Library: airway and intubation, airway and supraglottic airway

A review of the previously completed worksheet "When used by adequately trained healthcare providers, the LMA and ETC provide superior ventilation compared to face masks in patients in cardiac arrest” was also performed (Class IIA)."

**Final repeat search for additional articles performed August 5 2009.**

**State inclusion and exclusion criteria**

The following studies were excluded:
- studies not involving or simulating cardiac arrest or cardiac arrest models
- studies not involving intubation or a supraglottic airway device
- reviews that did not include LOE studies as part of the review

The following studies were included: animal studies, human studies, and mannequin studies involving intubation and/or use of a supraglottic airway during cardiac arrest, simulated cardiac arrest, or cardiac arrest model.

**Date range of articles: 1986 to 2009.**

**Number of articles/sources meeting criteria for further review:**

77 articles have been identified for further review. 11 of these articles involve neonatal/pediatric patients; the remaining 66 studies involve adult subjects.

34 articles were included in the final review. All pediatric articles as well as studies of usage and case reports were excluded from the final review. Studies were also excluded if they did not compare the use of a supraglottic airway to an endotracheal tube, with two exceptions. 3 additional articles were added as a result of the August 2009 search.
### Summary of evidence

**Evidence Supporting Clinical Question**

<table>
<thead>
<tr>
<th>Level of evidence</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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<tbody>
<tr>
<td>Staudinger 1993 #28 E,F Tentillier 2008 #29 G</td>
<td>Martin 1999 #21 G</td>
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### Level of evidence

- **A** = Return of spontaneous circulation
- **B** = Survival of event
- **C** = Survival to hospital discharge
- **D** = Intact neurological survival
- **E** = Other endpoint
- **F** = Time to ventilation
- **G** = Successful ventilation

* = Simulated arrest model (ICU or anesthetized patients)

**Italics** = Animal studies
### Evidence Neutral to Clinical question

<table>
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<th>Level of Evidence</th>
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<td></td>
<td>Lecky 2008 #20 C</td>
<td>Timmerman 2007 p. 286 #31 G</td>
<td>Chen 2008 #8 E*</td>
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<tr>
<td>Fair</td>
<td>Rumball 2004 #26 G</td>
<td>Genzwuerker 2001 #12 G</td>
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<td>Poor</td>
<td>Samarkandi 1994 #27 G</td>
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**Level of evidence**

A = Return of spontaneous circulation  
B = Survival of event  
F = time to ventilation  
G = successful ventilation  
* = simulated arrest model (ICU or anesthetized patients)

C = Survival to hospital discharge  
D = Intact neurological survival  
E = Other endpoint  
Italics = Animal studies

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**Explanation**

A = Return of spontaneous circulation  
B = Survival of event  
F = Time to ventilation  
G = Successful ventilation  
* = Simulated arrest model (ICU or anesthetized patients)
### Evidence Opposing Clinical Question

<table>
<thead>
<tr>
<th>Good</th>
<th>Atherton 1993 #2 G</th>
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<th>Prengel 2001 #23 E*</th>
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<td>Calkins 2006 #6 G</td>
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**Level of evidence**

A = Return of spontaneous circulation  
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Italics = Animal studies
**REVIEWER’S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:**

Only a single LOE 1 study exists comparing the use of a supraglottic airway device to an endotracheal tube during cardiac arrest. This study by Goldenberg (#13) in 1986 compared mortality and success of placement of an esophageal gastric airway versus an endotracheal tube by paramedics and found no difference in either outcome between the two devices.

One Cochrane review studied the use of supraglottic airway versus an endotracheal tube in cardiac arrest (#20) but only identified one adult study, the same Goldenberg study that qualified as LOE 1 evidence (#13).

The majority of evidence (LOE 4 and 5 studies) compares the success rate and efficacy of a supraglottic device versus an endotracheal tube. While overall outcome can be inferred from these studies, in the majority of studies the difference in time to ventilation or success of ventilation is fairly small (i.e. several seconds) so it is difficult to conclude whether actual cardiac arrest outcome would be affected by the airway device chosen. A significant number of these studies were performed in mannequin models or anesthetized patients. It is unclear whether the results of studies performed in mannequin models are applicable to the human resuscitation scenario since no aspiration can occur. Mannequin models also may not accurately reflect the variability in airway anatomy encountered in patients during cardiac arrest. Simulated human models such as ICU patients or anesthetized patients also may not accurately represent a patient in cardiac arrest.

The majority of studies address therapeutic endpoints such as time and success of ventilation and oxygenation (#1-6, #9-15, #19, #21, #22, #24-26, #28, #29-31, #34). A few studies also addressed rate of survival, although all three of the studies found neutral results, i.e. a supraglottic airway versus an endotracheal tube did not change overall survival (#13, #20, #24). A small number of studies in mannequin models addressed the quality of resuscitation with a supraglottic airway versus an endotracheal tube (#1, #11, #32, #34).

Of the level 1 evidence that does exist (# 13, # 20), the performance of a supraglottic airway seems to be equivalent to the endotracheal tube as far as time to placement and success of ventilation during cardiac arrest. One study in a mannequin model (#12) also showed the two devices to be equivalent in performance.

Three LOE 2 studies were identified (#2, #28, #29). A prospective study by Atherton (#2) evaluated the use of a Combitube versus an endotracheal tube by Paramedics and found a higher success rate (84%) with an endotracheal tube versus the Combitube (69%). Staudinger’s study (#28) compared the time to intubation and post-intubation blood gas analysis in ICU patients when intubated by ICU nurses with either an endotracheal tube or the Combitube. The Combitube was placed more quickly, but blood gas analyses were similar between the two groups. The study by Tentiller (#29) prospectively evaluated the use of an intubating LMA after failed endotracheal intubation by emergency physicians in the field. The intubating laryngeal mask airway was successfully placed in 45 patients, 41 of which had failed two attempts at tracheal intubation. In the remaining 4 patients, the intubating laryngeal mask airway was used as the first attempt due to inability to perform tracheal intubation. Insertion success rate in these patients was very high (96%) as was successful tracheal intubation through the device (91%).

A high rate of success has been demonstrated in simulated cardiac arrest and mannequin models for both experienced (#25) and un-experienced providers (#5, #30). One LOE 2 study in cardiac arrest patients found that a supraglottic airway was faster to insert than an endotracheal tube (#28) which could affect overall outcome. Four LOE 5 studies performed on mannequin models or anesthetized patients (#1, #4, #9, #22) have also shown faster insertion times for a supraglottic airway. Two studies (LOE 2 and LOE 4) in cardiac arrest patients (# 21, # 29) as well as one study in anesthetized patients (#14) demonstrated a high success of supraglottic airway placement after failure of endotracheal intubation. A supraglottic airway could potentially affect overall outcome if placed more quickly or successfully placed after endotracheal intubation failed.

Three studies demonstrated that a supraglottic airway device was faster to insert when providers were wearing chemical protective gear (# 3, #10, #14). These studies were performed using anesthetized patients (#3), mannequin models (#10) and animal models (#14) so it is unclear whether these studies can be extrapolated to the cardiac arrest population.

A study by Hoyle et al. (#16) in a mannequin resuscitation model suggests that a supraglottic airway may be superior to an endotracheal tube when there is restricted access to the airway.
The shorter time to placement of a supraglottic airway versus an endotracheal tube varies among studies, but the majority report 20-39 seconds for a supraglottic airway versus 30-88 seconds for an endotracheal tube (#3, #5, #10, #14, #22, #25, #34).

Multiple supraglottic airways are now commercially available. Devices used in the studies reviewed include the laryngeal mask airway (LMA), Proseal LMA, Combitube, laryngeal tube (LT), i-gel, Intubating LMA, and King tube. The Proseal LMA, LT-Suction, and i-gel all contain an additional port to decompress the stomach. The newest supraglottic airway commercially available, the i-gel, does not require any insufflation during placement. The intubating LMA combines a supraglottic airway with a conduit for intubation, allowing both quick ventilation and intubation, which may also provide an advantage during resuscitation. This device has been studied in both cardiac arrest patients (#29, #31) and simulated arrest models (#30). One potential concern about the use of the supraglottic airway during resuscitation is the risk of regurgitation and aspiration. With the availability of newer supraglottic devices that can decompress the stomach or act as a conduit for intubation, this may be less of a concern. A study by Genzwuerker (#12) showed no difference in gastric insufflation with a supraglottic airway versus an endotracheal tube in a mannequin model.

Four LOE 5 studies performed in simulated arrest models suggest that the placement of a supraglottic airway as opposed to an endotracheal tube may improve outcome by decreasing no-flow time (#32, #33) or improving the ability to follow resuscitation protocols (#1, #11).

Although a significant number of studies reviewed were neutral in respect to the topic, they did demonstrate that the supraglottic airway performed as well as an endotracheal tube in a number of cardiac arrest studies (#13, #20, #24, #26) as well as mannequin models and simulated arrest models (#5, #12).

Some studies suggest that endotracheal intubation may adversely affect outcome. Jaeger et al. (#17) report a case of tracheal injury after multiple intubation attempts during resuscitation. Katz and Falk (#18) reported a fairly high rate of misplaced or improperly placed endotracheal tubes by paramedics.

Two LOE 5 studies suggest that drug delivery through a supraglottic airway device may not be as effective as via an endotracheal tube (#7, #23) A more recent study by Chen et al. (#8) found effective and equivalent epinephrine levels when delivered via an endotracheal tube versus a catheter placed into the trachea via an LMA. Two of these studies used a pig model and the other study used anesthetized patients so it is unclear how this data should be extrapolated to the cardiac arrest patient. Only the 2009 study by Chen studied a pig model during cardiac arrest.

Acknowledgements: None

Citation List


LOE 5
Quality good
Supportive
Summary: Study comparing effect of tracheal intubation versus Combitube placement on time to perform other resuscitation tasks in mannequin cardiac arrest model. Time to airway placement and time without chest compressions was much shorter with Combitube placement. Other tasks such as IV insertion or drug delivery were not affected by choice of airway device. This study was funded by an educational grant.


LOE 2 (concurrent ETT control group)
Quality good
Opposing
Summary: Prospective study of Combitube use in paramedics. After being trained in use of the combitube, paramedics used Combitube for airway management on even-numbered calendar days and endotracheal intubation on odd-numbered calendars, with Combitube to be used as an adjunct on odd days if endotracheal intubation failed. A follow-up study was also performed to evaluate the skill retention level for the Combitube on a mannequin model. Success rate of the Combitube was 69% compared to endotracheal intubation (84%). When used as a backup method after failed endotracheal intubation, the Combitube was successful in 64% of cases. In the follow-up study, 89% of paramedics did not follow proper procedure for correct Combitube placement.


LOE 5
Quality fair (pseudo-randomized)
Supportive
Summary: Study comparing time to place a laryngeal mask airway versus an endotracheal tube in a mannequin cardiac arrest model by both anesthetists and non-anesthetists while wearing protective gear. Both groups inserted the laryngeal mask airway significantly faster (p<0.05) than the endotracheal tube. Failure rates were not significantly different between the two groups or between the two devices.


LOE 5 (anesthetized patients)
Quality good
Supportive
Summary: Nurses randomized to be trained in either laryngeal mask placement or tracheal intubation via direct laryngoscopy. Each group then performed the task first on a mannequin model and then in anesthetized patients. Successful placement in patients was higher with the laryngeal mask than with direct laryngoscopy (97% versus 39%). The patients in the LMA group were then tracheally intubated through the LMA device with a 60% success rate. This was a small study (eight nurses) but suggests that non-experienced providers may have better success with a supraglottic device.

LOE 5
Quality good
Neutral
Summary: Prospective randomized cross-over study performed in Navy Seal corpsmen. After classroom training, participants placed a randomized airway device into a mannequin (ETT, LMA, or Combitube) in a combat casualty scenario. LMA insertion was significantly faster than the other devices (22 seconds vs 36 and 40 seconds). When participants surveyed, however, endotracheal intubation was the preferred airway device over the LMA or Combitube.


LOE P3 (retrospective chart review)
Quality fair
Opposing
Summary: Retrospective chart review of patients in whom a Combitube was placed for airway management. Data was compared to charts of patients who were endotracheal intubated during the same time period. Success and complication rates compared. Endotracheal intubation showed a high success rate (84%) compared to the Combitube (70%). Combitube complication rate was 40%, which included inability to confirm placement due to emesis from both ports. Of note, protocol for airway management in the group studied dictates that a combitube be placed after endotracheal intubation fails, so all the cases in the Combitube group had previously failed endotracheal intubation.


LOE 5 (animal study)
Quality fair
Opposing
Summary: Study performed in pigs comparing the effects of epinephrine administration through a laryngeal mask airway versus an endotracheal tube. Epinephrine peak plasma concentration (PPE) as well as heart rate and blood pressure were measured after the pigs received epinephrine either intravenously, via the endotracheal tube, via the upper end of the laryngeal mask airway, or via a catheter placed through the laryngeal mask airway into the trachea. The catheter delivers aerosolized medication while allowing ventilation and was placed below the vocal cords using fiberoptic bronchoscopy. PPE was highest in the group receiving epinephrine intravenously and lowest in the group receiving it through the LMA. PPE was not significantly different between the groups receiving epinephrine via the endotracheal tube versus through a catheter placed through the laryngeal mask airway. Mean arterial blood pressure significantly increased only with intravenous administration of epinephrine. This study suggests that drug delivery during cardiac arrest via a laryngeal mask airway may be less effective than delivery via an endotracheal tube.

LOE 5 (animal model)
Quality Good
Neutral
Summary: This prospective animal study measured epinephrine levels in pigs during cardiac arrest when delivered through an endotracheal tube or a laryngeal mask airway (LMA). Epinephrine was delivered through the LMA either from the upper end of the device or via a catheter inserted through the LMA into the trachea. Plasma epinephrine levels were measured pre-cardiac arrest and every 2 minutes after cardiac arrest for a total of nine samples. Epinephrine levels were comparable between the three groups. The highest levels were achieved via the catheter placed through the LMA, and the lowest (but still adequate for resuscitation) levels were achieved via the upper end of the LMA.


LOE 5 (anesthetized patients)
Quality good
Supportive
Summary: Study comparing performance of paramedics when placing a laryngeal mask airway versus an endotracheal tube in anesthetized patients. Laryngeal mask insertion was successful in 88.8% of patients as opposed to endotracheal intubation which was only successful in 71.2% of patients (p=0.049). There was no significant time to insertion when the devices were successfully placed. Also of note, the laryngeal mask airway was successfully placed in 80% of patients in which endotracheal intubation had failed.


LOE 5 (anesthetized patients)
Quality good
supportive
Summary: Randomized crossover study comparing time to intubation with ETT vs LMA in anesthesiologists wearing surgical attire versus full antichemical protective gear. Study performed on anesthetized patients. Chemical gear slowed intubation (31 vs 54 sec) but not LMA insertion (44 vs 39 sec).


LOE 5
Quality fair (not randomized)
Supportive
Summary: Study performed in a mannequin model comparing the time of insertion of an endotracheal tube versus several supraglottic airways (i-gel, LMA-Classic, LMA-Proseal) both with and without the performance of chest compressions. Both with and without chest compressions, the
i-gel device was significantly faster to place than all the other devices. Times needed to place an endotracheal tube versus both LMA devices were not significantly different. Chest compressions delayed tracheal intubation for only 3 seconds, which the authors felt was not clinically significant, suggesting that chest compressions should be continued while the airway is secured. The i-gel, a new device on the market, does not require insufflation, which may explain the quicker placement time. The i-gel and LMA-Proseal both have a drainage tube that can allow decompression of the stomach.


LOE 5
Quality fair (not randomized)
Neutral
Summary: The laryngeal tube and endotracheal tube and face mask were compared in a mannequin cardiac arrest model. Both the laryngeal tube and tracheal tube provided superior ventilation than the face mask both with a bag-valve device and an automatic transport ventilator. There were no significant differences seen in tidal volumes between the laryngeal tube and the endotracheal tube. Gastric insufflation was seen only with the face mask.


LOE 1
Quality: Good
Neutral
Summary: Study in adult cardiac arrest patients comparing the use of an endotracheal tube versus an esophageal airway. There was no differences in mortality between the two devices. Successful placement was high in both groups but paramedics judged adequacy of ventilation to be better with an endotracheal tube. This study was included in the meta-analysis by Lecky (#41).


LOE 5
Quality fair (pseudo-randomized)
Supportive
Summary: Prospective study performed in monkeys comparing the time to intubation and success rate of both the laryngeal mask airway and endotracheal intubation while wearing anti-chemical warfare protective gear. Both anesthetists and non-anesthetists were tested. Laryngeal mask airway placement was significantly faster in both groups tested (3.6 seconds vs 28.6 seconds). Intubation failure rate was fairly high in both groups (35-55%) with the endotracheal tube. All Laryngeal mask placement attempts were successful.


LOE P3 (retrospective review)
Quality fair
Supportive
Summary: Retrospective study of King airway use after failed intubation by Air medical providers. The King airway device is a single lumen device that occludes the esophagus and posterior oropharynx. 27 patients (4.7% of total patients) met criteria (three failed intubation attempts). The King airway device was successfully placed in 26 patients; one patient received a Combitube. In-hospital airway management of several of these patients was complex. The King airway was also chosen instead of an endotracheal or after a single intubation attempt in several cases. Only 5 of the patients were in cardiac arrest; the majority were trauma patients.


LOE 5
Quality Good
Supportive
Summary: This prospective randomized cohort study assessed the speed of placement, number of attempts, and time to ventilation with the Combitube, Laryngeal Mask Airway (LMA), or endotracheal tube in a mannequin resuscitation model with restricted airway access. Mannequins were placed in three scenarios restricting access to the airway: under a table with head abutting a wall, access to the head from behind the mannequin, or a mannequin lying on its side. The LMA was faster to insert than the other devices in all three scenarios, and both the Combitube and the LMA were inserted faster than an endotracheal tube in two out of three scenarios. Number of attempts were similar among all three devices.


LOE 4 (Case report)
Quality fair
Supportive
Summary: Case report of tracheal injury as a result of several unsuccessful attempts at tracheal intubation during cardiopulmonary resuscitation. Mask ventilation was also difficult. This case report highlights the potential complications associated with difficult intubation and supports the use of a supraglottic airway as an alternative airway device.


LOE 4
Quality good
Supportive
Summary: Prospective study of all intubated patients brought to the emergency department. Correct placement of endotracheal tube assessed on arrival for end-tidal carbon dioxide and by chest auscultation. Direct laryngoscopy used if placement unclear, performed in 63% of patients. 25% of endotracheal tubes found to be improperly placed, with 17% placed in the esophagus and 8% placed in the hypopharynx. 56% of the patients who arrived in the ED with esophageal tube placement expired. This study highlights the potential complications of intubation and supports the potential use of a supraglottic airway device in the field.

LOE 5
Quality good
Supportive
Summary: Study comparing the laryngeal mask, tracheal intubation and bag-mask ventilation in a mannequin cardiac arrest model. Ventilation established more rapidly with the laryngeal tube than with tracheal intubation.


LOE 1
Quality good
Neutral
Summary: Cochrane review of emergency intubation in acutely ill patients. Three RCTs identified, two of which showed a nonsignificant disadvantage of intubation versus a supraglottic airway (Combitube or Esophageal gastric tube airway). Overall the review found no difference in survival between intubation and other airway strategies.


LOE 4
Quality good
Supportive
Summary: Prospective non-randomized study assessing the performance of the laryngeal mask airway after failed endotracheal intubation in patients requiring air transport. Small study of 17 patients who has failed endotracheal intubation; 16/17 (94%) were successfully intubated with the laryngeal mask airway with adequate oxygenation and ventilation.


LOE 5 (anesthetized patients)
Quality good
Supportive
Summary: Comparative study of laryngeal mask airway versus endotracheal tube placement by paramedical personnel in anesthetized patients. Successful ventilation as detected by end-tidal carbon dioxide was much faster with the laryngeal mask airway (38 seconds vs 88 seconds, p<0.0001). Overall success rate was also higher with the laryngeal mask airway versus the endotracheal tube (94% versus 69%, p<0.01).

LOE 5 (anesthetized patients as cardiac arrest model)
Quality good
Opposing
Summary: Study comparing efficacy of lidocaine administration via an endotracheal tube versus a laryngeal mask airway in anesthetized patients. Equivalent does of lidocaine administered through each device and plasma lidocaine measurements assessed. Therapeutic plasma concentrations were achieved in all patients when delivered endotracheally but in only 40% of patients who received the dose via the laryngeal mask airway (p<0.05). Peak lidocaine concentrations were higher in the group receiving the medication endotracheally (p<0.05) and peaked more quickly (0.75 min versus 1.75 min via the laryngeal mask airway).


LOE2 (pseudorandomized)
Quality good
Neutral
Summary: Prospective study comparing Combitube to endotracheal tube for time and ease of insertion, efficacy of epinephrine delivery, and survival. Devices were placed on alternate days. Success rates for the two devices were similar: Endotracheal tube 94%, Combitube 98%. Efficacy of epinephrine administration and survival were also not significantly different between the two devices.


LOE 5 (anesthetized patients)
Quality fair (very small study)
Supportive
Summary: Prospective trial comparing laryngeal mask airway and endotracheal tube placement by paramedics and respiratory therapists in anesthetized patients. Paramedics randomized to place first one device followed by the other. Mean time to ventilation was significantly shorter with the laryngeal mask than with the endotracheal tube (38.9 seconds vs 209 seconds). The success rate was also significantly higher with the laryngeal mask (100% vs 52.6%).


LOE 2 (pseudorandomized)
Quality fair
Neutral
Summary: Prospective study comparing success rate of Combitube versus endotracheal intubation by ambulance attendants. Participants divided into 3 groups: Combitube insertion, endotracheal tube insertion, and endotracheal tube insertion with continued mannequin practice. Success rates were similar among all three groups. Endotracheal intubation success rates did appear to be slightly improved by continued practice in the study, although the adherence to practice was not closely monitored.

LOE 2
Quality fair
Neutral
Summary: Prospective study comparing three types of airway management in cardiac arrest patients. Group 1 received a laryngeal mask airway, group 2 received an endotracheal tube (control group) and group 3 received a laryngeal mask airway initially which was then converted to an endotracheal tube. All patients in groups 1 and 3 were successfully ventilated with the laryngeal mask airway. No significant differences were seen in oxygen saturation measurements between the three groups, although the range reported for group 1 much wider than the other two groups. No regurgitation occurred in any of the groups.


LOE 2
Quality good
Supportive
Summary: Study performed in ICU patients comparing endotracheal tube placement by ICU physicians to Combitube placement by nurses during CPR. Time to intubation and arterial blood gas results after airway management measured. Time to intubation was significantly shorter for the Combitube than the endotracheal tube (18.5 vs 27.2 sec). Arterial blood gas results were similar, with a slightly higher PaO2 in the Combitube group (123mm Hg vs 106 mm Hg).


LOE 2
Quality good
Supportive
Summary: Prospective study of use of the Intubating laryngeal mask airway after failed tracheal intubation by emergency physicians in the field. The intubating laryngeal mask airway was successfully placed in 45 patients, 41 of which had failed two attempts at tracheal intubation. In the remaining 4 patients, the intubating laryngeal mask airway was used as the first attempt due to inability to perform tracheal intubation. Insertion success rate in these patients was very high (96%) as was successful tracheal intubation through the device (91%). Cardiac arrest occurred prior to airway management in 50% of the patients studied.


LOE 5 (anesthetized patients)
Quality good
Supportive
Summary: Prospective crossover study comparing the time to intubation and success rate of the Intubating laryngeal mask airway (ILMA) as compared to tracheal intubation by novices in anesthetized patients. Medical students, after receiving training on a mannequin model, were randomly assigned to ventilate and intubate several patients with either the ILMA or bag-mask ventilation followed by laryngoscopy and tracheal intubation. If the randomized technique failed, the novice was allowed to attempt the alternate technique. Successful ventilation rates were higher in the ILMA group (97.8% vs 85.6%, p<0.01). Time to ventilation was also shorter with the ILMA. Tracheal intubation was successful at a higher rate and with fewer attempts using the ILMA (92.2% vs 60%, p<0.01).


LOE 2
Quality good
Neutral

Summary: Prospective study of out of hospital difficult airway management and use of the intubating laryngeal mask airway (ILMA). Eleven out of 146 patients requiring airway management during the study period were identified as difficult to manage. The remaining 135 (92.5%) were successfully intubated by tracheal intubation. All eleven patients were successfully intubated using the ILMA, ten on the first attempt. 37% of patients studied experienced cardiac arrest.


LOE 5
Quality fair (pseudo-randomized)
Supportive

Summary: Study comparing time to placement and effect on "no flow" time with placement of a laryngeal tube versus an endotracheal tube in a mannequin cardiac arrest model. Time to insert the laryngeal tube was significantly shorter than the endotracheal tube (13 sec vs 52 sec). The "no flow" time was also significantly shorter with the laryngeal tube (109 sec vs 192 sec). Correct placement occurred more frequently with the laryngeal tube (98%) than the endotracheal tube (72%). This study suggests that placement of a laryngeal tube as opposed to an endotracheal tube may improve survival by allowing a shorter "no-flow" time and better adherence to resuscitation protocols.


LOE 5
Quality Good
Supportive

Summary: This is a more recent randomized prospective mannequin study comparing the no flow time during simulated cardiac arrest when either a laryngeal tube suction device (LTS-D), endotracheal tube, or bag mask ventilation was used for airway management. The no-flow time was significantly reduced with the use of the LTS-D compared to either the endotracheal tube or bag
mask ventilation. Time to insertion was also faster with the LTS-D than the ETT. The study also found a higher adherence to protocol guidelines with the use of the LTS-D.


LOE 5
Quality fair (not randomized)
Supportive
Summary: Study performed comparing placement of Laryngeal Mask, Combitube, and endotracheal tube by unskilled operators in a mannequin. Laryngeal mask was faster in insert on average (21.4 sec) versus the endotracheal tube (30.3 sec) or Combitube (34.1 sec). Unclear whether these times would be clinically significant. When surveyed, 89% of the participants preferred the Combitube as opposed to the other two devices used.