

TOP 10 FACTS

Top 10 Facts You Need to Know About Intubation

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Ensuring optimal airway management is a critical aspect of patient care, requiring a comprehensive and adaptable approach. The following guidelines offer a systematic framework for healthcare professionals to navigate the complexities of airway interventions. Emphasizing the importance of treating each airway as potentially challenging, these recommendations span pre-intubation preparations, equipment choices, and considerations for post-intubation scenarios. From leveraging advanced tools like video laryngoscopy to recognizing the role of checklists and mental preparedness, this comprehensive list aims to enhance success rates while minimizing adverse events. Below are 10 essential practices which contribute to the overarching goal of improving patient outcomes in adult airway management.

Ensuring optimal airway management is a critical aspect of patient care, requiring a comprehensive and adaptable approach. In rural areas, specialty consultation such as anesthesiology may not be available. Rural physicians frequently intubate patients without backup. The following guidelines offer a systematic framework for these physicians to navigate the complexities of airway interventions. Emphasizing the importance of treating each airway as potentially challenging, these recommendations span pre-intubation preparations, equipment choices, and considerations for post-intubation scenarios. From leveraging advanced tools like video laryngoscopy to recognizing the role of checklists and mental preparedness, this comprehensive list aims to enhance success rates while minimizing adverse events. Below are 10 essential practices which contribute to the overarching goal of improving patient outcomes in adult airway management.

1. Treat every airway as an “Anatomically Difficult” airway.

Patients’ facial and neck structures can vary widely, posing unique challenges to airway management. Despite the introduction of multiple exams to predict anatomically difficult airways, no tool reliably predicts them. Therefore, it is crucial to perform a thorough physical exam on every patient prior to intubation and prepare for an anatomically difficult airway regardless of the pre-procedure exam.¹

2. Use a video laryngoscope whenever available.

A recent large, randomized control trial and a recent metanalysis have again demonstrated the superiority of video laryngoscopy over direct laryngoscopy in adult patients.² Video laryngoscopy performed by an experienced anesthesiologist resulted in higher first attempt success, better visualization of the glottic opening, and a lower rate of mucosal trauma in known difficult airways.^{3,4} For Rural physicians who may need to intubate patients, priority should be placed on having a video laryngoscopy apparatus available.

3. Use waveform capnography to confirm tracheal placement of the endotracheal tube.

Waveform capnography has proven to be superior to auscultation of breath sounds and simple capnography in detecting esophageal intubation. Its use could have prevented up to 76% of deaths and permanent neurological disabilities caused by unrecognized failed intubation attempts.^{5,6}

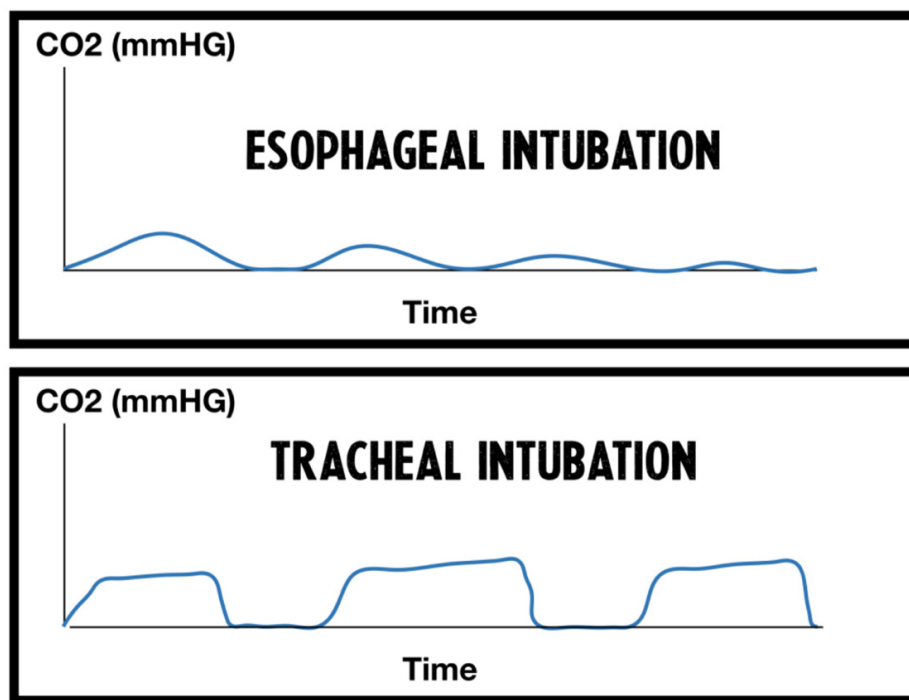


Figure 1. Esophageal versus Tracheal EtCO₂ waveforms. (Author-created)

4. Use supraglottic airway devices.

Supraglottic airways (SGAs) are valuable tools for ventilating patients who cannot be adequately ventilated with a bag-valve-mask device due to anatomical constraints. When intubation attempts fail, and manual ventilations are also unsuccessful, SGA can successfully ventilate the patient in 62.8% of cases. Despite their effectiveness in managing

anatomically difficult airways, their use remains limited.^{7,8} SGAs require less training and less skill to place. In rural areas with limited training opportunities, SGAs may be the best option. In cardiac arrest, intubating a patient may actually decrease survival rates, as it can interfere with chest compressions and defibrillation. In these situations, an SGA is fast and easy. It also allows for fewer personnel to ventilate and an opportunity to use an end-tidal CO₂ detector.⁹⁻¹¹

5. Checklists are not dead! Use them.

Checklists have been widely used in aviation to ensure critical actions are taken during high-stress events. Similarly, checklists have been applied to high-stress medical situations such as intubation. While the effectiveness of pre-intubation checklists to prevent adverse events is not clear, retrospective and before/after studies have demonstrated a reduction in adverse events. However, prospective studies struggle to show patient-centered benefits. One meta-analysis did show a decrease in hypoxic events with checklist use, but this benefit disappeared when studies with low risk of bias were examined.¹²⁻¹⁶ However, in the most recent meta-analysis, none of the studies were done in rural settings in the United States.¹⁶ In a rural setting, without specialist backup, stress levels increase which increases the likelihood of error. Based on our experience, in rural areas without specialist backups, checklists are invaluable.

6. When pre-oxygenating with a non-rebreather mask (NRM), turn the flow all the way up.

A non-rebreather mask is commonly used to preoxygenate spontaneously breathing patients before intubation. However, setting the flow meter to 15 LPM delivers a lower FiO₂ than desired. By turning the flow meter clockwise beyond the standard 15 LPM, the flow rate will continue to increase beyond 15LPM. The maximum flow rate will vary based on the flowmeter, but some can reach as high as 70 LPM. The best head-to-head comparison of devices has been based on end-tidal oxygen (EtO₂) measurements which is a surrogate for the effectiveness of pre-oxygenation and nitrogen washout. Studies have shown that a flush rate NRM achieves the highest fraction of EtO₂, while setting the flow to 15 LPM achieves the lowest EtO₂ of the modalities included in this study.¹⁷ Therefore, whenever using an NRM for preoxygenation, the flow meter should be set to the flush rate.

7. Pre-oxygenate with a noninvasive ventilator (NIV) when the functional residual capacity (FRC) is decreased.

Conditions such as pregnancy, obesity, ARDS, and COVID pneumonia can decrease the FRC, leading to shorter apnea times before desaturation occurs. Preoxygenating with pressure can increase the FRC and allow for longer apnea times. Noninvasive ventilation (NIV) has demonstrated significantly higher levels of EtO₂ compared to bag-valve-mask devices with a PEEP valve. Therefore, for patients with decreased FRC and difficult oxygenation, NIV should be used for preoxygenation.^{17,18}

8. Mentally prepare to perform a cricothyroidotomy every time you intubate.

Unsuccessful intubation and inability to ventilate despite utilizing a supraglottic airway device can quickly lead to cardiac arrest if no other means of oxygenation and ventilation is established. Mentally preparing to perform a cricothyroidotomy before every airway can reduce hesitation in cases of failed intubation and ventilation. Identifying the necessary equipment and marking landmarks can expedite the procedure if intubation attempts fail and the patient cannot be ventilated. Given that this procedure is a high-acuity low-occurrence event, best practices among techniques and patient-centered outcome data is not available. However, in cases when a patient cannot be intubated and cannot be ventilated, it is the only option left.¹⁹

9. Prepare for post-intubation hypotension on every patient with a shock index above 0.7.

Post-intubation cardiac arrest (PICA) occurs in 4% of intubations performed in the Emergency Department (ED), and 84% of patients who suffer from PICA will die during that hospitalization. Additionally, 23% of ED-intubated patients experience post-intubation hypotension (PIH), resulting in higher in-hospital mortality rates. Use of the Shock Index (SI) is recommended by the Society of Airway. The SI is simply the heart rate divided by the systolic blood pressure. Patients with an SI greater than 0.7 should be assumed to be at risk for PIH and PICA.²⁰⁻²³

10. Do not be afraid of neuromuscular blockade!

Rural physicians may be apprehensive about utilizing neuromuscular blockade if they lack experience intubating patients. Evidence shows a dramatic decrease in adverse events when neuromuscular blockade is utilized.²³ Paralytics, such as 1.5 mg/kg of succinylcholine or 1.2 mg/kg of rocuronium bromide, will allow the first attempt to be the best attempt.²⁴ Multiple attempts increase the chances of aspiration as well as airway trauma. If a paralytic is given and the patient is unable to be intubated, use of a bag-valve-mask (BVM) device or an SGA can provide oxygenation and ventilation while preparations are made for a subsequent attempt.^{24,25}

In summary, when managing airways in adults, it is essential to approach each case as if it could present anatomical difficulties. Utilizing video laryngoscopy, waveform capnography, supraglottic airway devices, and checklists can enhance success rates and reduce adverse events. Optimizing preoxygenation, mentally preparing for cricothyroidotomy, and being aware of post-intubation complications like hypotension can further improve patient outcomes. Lastly, in undifferentiated cardiac arrest, prioritizing effective chest compressions and early defibrillation over immediate intubation can save lives.

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