The Role Of Doctors, Anesthesiologist, Nurses, Respiratory Therapists And X-Ray Technicians In Case Of Endotracheal Intubation For A Patient In The Er

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Abstract
Endotracheal intubation (ETI) is a crucial intervention frequently performed in emergency departments for patients with compromised airways. This paper discusses the roles of doctors, anesthesiologists, nurses, respiratory therapists, and X-ray technicians in the ETI process, emphasizing the importance of multidisciplinary collaboration. Doctors assess the need for intubation, select appropriate methods and pharmacological agents, and lead the airway management team. Anesthesiologists handle complex cases, guide medication selection, and address adverse events. Nurses prepare equipment, monitor vital signs, administer medications, and provide post-intubation care. Respiratory therapists optimize preoxygenation, confirm tube placement, and adjust ventilator settings. X-ray technicians perform imaging to verify tube positioning and identify complications. Recent advancements include the use of video laryngoscopy, which improves first-pass success rates, and point-of-care ultrasound for confirming tube placement. The choice of induction agents, such as ketamine or etomidate, and paralytics, like succinylcholine or rocuronium, should be individualized based on patient factors. Adequate post-intubation sedation is crucial to prevent awareness during paralysis. Physiological factors, including hypoxia, right ventricular failure, and metabolic acidosis, increase the risk of peri-intubation adverse events. Preoxygenation and apneic oxygenation techniques extend safe apnea time. The coordinated efforts of the multidisciplinary team, combined with evidence-based practices and technological advancements, are essential for maximizing first-pass success rates, minimizing complications, and improving patient outcomes during ETI in the emergency room setting.
Keywords:doctors, anesthesiologist, nurses, respiratory therapists, x-ray technicians.

Introduction

Airway management, including endotracheal intubation (ETI), is a complex yet essential skill for emergency physicians. Annually, over 410,000 intubations are performed in emergency departments (EDs) (Brown et al., 2015). ETI in the ED is predominantly conducted using rapid sequence intubation, which involves the administration of sedative and paralytic agents. This procedure is performed for various indications, including airway obstruction (e.g., anaphylaxis, thermal injury, or neck trauma), failure of oxygenation or ventilation, and significant obtundation or weakness, resulting in the inability to protect the airway.

Patients requiring ETI in the ED differ significantly from those undergoing intubation in planned, routine operative settings. ED patients often present with critical illness, reduced respiratory reserve, multiple comorbidities, and complicating factors such as limited mouth opening or cervical spine injuries. Achieving first-pass success is crucial, as failure on the initial attempt increases the likelihood of adverse events, such as hypoxia, hypotension, and even cardiac arrest, by 33% (Maguire et al., 2023).

Recent years have seen numerous advancements in the approach to ETI in adult patients. This paper aims to discuss several key updates relevant to adult patients requiring ETI in the ED. However, this focused update does not serve as a comprehensive review of ETI.

What are the most accurate tools for predicting a difficult airway?

Difficult airways are encountered more frequently in the ED compared to the operating room and are often more challenging to predict due to the critical condition of patients, which may preclude obtaining a thorough history or performing an adequate airway assessment. Literature regarding the incidence of difficult airways varies depending on the setting and patient population, with estimates ranging from 3% to 15%, although data specific to ED patients are limited. A difficult airway can lead to a "cannot ventilate, cannot intubate" situation, resulting in complications such as brain injury, hemodynamic instability, or death. Nevertheless, ETI failure rates remain low overall, occurring in fewer than 1% of attempts (Sakles et al., 2017).

Numerous tools have been developed to predict difficult bag-valve-mask (BVM) ventilation, intubation, and cricothyrotomy. These tools typically assess a combination of anatomical and physiological factors, including modified Mallampati classification, thyromental distance, sternomental distance, neck circumference, prominent upper incisors, upper lip bite test, cervical spine mobility or stiffness, obesity, and advanced age. Tools used to predict difficult BVM ventilation include MOANS (mask seal, obesity, age, no teeth, and stiffness) and ROMANS (see below). The LEMON assessment is widely used for predicting difficult intubation (see below).

ROMAN Assessment for Difficult BVM Ventilation

- **Radiation/Restriction**: Reduced airway tissue pliability and poor lung compliance (e.g., asthma, pulmonary edema).
- **Obstruction/Obesity/OSA**: Upper airway obstruction, redundant tissue, or increased chest/abdominal weight increases resistance.
- **Mask Seal**: Difficult with abnormal facial anatomy, facial hair, or oropharyngeal fluids (e.g., vomit). Mallampati III/IV and male sex worsen seal.
- **Age**: >55 years reduces tissue elasticity and increases pulmonary pathology risk.
- **No Teeth**: Edentulous patients have reduced mask seal quality.

LEMON Assessment for Difficult Intubation

- **Look Externally**: Abnormal facies, trauma, or short neck.
- **Evaluate (3-3-2)**:
  - **3 fingers**: Mouth opening.
  - **3 fingers**: Mentum to hyoid bone.
  - **2 fingers**: Thyroid cartilage to laryngeal notch.
- **Modified Mallampati**: Class 0-II predicts easy; III-IV predicts difficulty.
- **Obstruction/Obesity**: Supraglottic mass, hematoma, or redundant tissue.
- **Neck Mobility**: Restricted by collars, arthritis, or kyphosis.

The upper lip bite test, in which patients extend their jaw and attempt to cover their upper lip with their lower incisors, is a predictor of difficult laryngoscopy. A meta-analysis of 27 studies reported that this test has a specificity greater than 85% and sensitivity exceeding 70% for predicting difficult laryngoscopy. For predicting difficult cricothyrotomy, the SMART criteria is commonly utilized (see below) (Bair & Chima, 2015).

SMART Assessment for Difficult Cricothyrotomy

- **Surgery**: Previous neck surgeries causing scarring.
- **Mass**: Abscesses, hematomas obstruct the field.
- **Access/Anatomy**: Poor landmarks or obesity.
- **Radiation**: Tissue deformity or scarring from prior radiation.
- **Tumor**: Airway or neck tumors obstruct access.

A 2018 Cochrane review evaluated the effectiveness of various tools in predicting difficult face mask ventilation, laryngoscopy, and ETI in patients without known anatomical abnormalities. This review found that tests such as the Mallampati score, modified Mallampati score, Wilson score, thyromental distance, sternomental distance, mouth opening test, and upper lip bite test demonstrated sensitivities ranging from 22% to 67%, while specificities were higher, ranging from 80% to 93%. Similarly, a 2019 systematic review identified factors such as upper lip bite test results, shorter hyomental distance (<3–5.5 cm), retrognathia (mandible <9 cm from the angle of the jaw to the chin tip), abnormal Wilson score, and a modified Mallampati score of ≥3 to be associated with difficult ETI. However, no single parameter was able to reliably exclude the possibility of a difficult airway(Detsky et al., 2019).

Numerous studies have assessed the role of point-of-care ultrasound (POCUS) in predicting difficult airways. Measurements include the distance from the skin to epiglottis (DSE), distance from skin to vocal cords (DSVC), hyomental distance (HMD), and tongue thickness. DSE involves positioning a linear probe transversely at the level of the thyrohyoid membrane and measuring the distance from the skin surface to the anterior aspect of the epiglottis. A meta-analysis reported DSE had a sensitivity of 82% and a specificity of 91% for predicting a difficult airway. DSVC is measured by placing a linear probe transversely at the level of the vocal cords and determining the distance from the skin to the anterior commissure, with a sensitivity of 75% and specificity of 72%.

HMD is evaluated by using a curvilinear probe sagittally in the midline of the neck to measure the distance between the hyoid bone and the mentum of the mandible. A threshold of 5.29 cm in the neutral head position showed a sensitivity of 97% and specificity of 72%. Additionally, a study reported that comparing the HMD ratio in maximal extension versus neutral position, with a threshold of 1.23, had a sensitivity of 100% and specificity of 91%. Tongue thickness, assessed by positioning a linear probe transversely under the chin, has been reported to have a sensitivity of 71–75% and specificity of 72% (Yadav et al., 2019).

POCUS is also valuable for identifying the cricothyroid membrane to facilitate cricothyrotomy. However, clinicians are cautioned against relying on these sonographic or clinical tools in isolation. Instead, all intubations in the emergency department (ED) should be approached as potentially difficult, with a backup airway plan in place for unsuccessful initial attempts.

Physiologic Factors Associated with Peri-Intubation Adverse Events

Peri-intubation adverse events, including hypoxia, hypotension, and cardiac arrest, are common during endotracheal intubation (ETI) in the ED. A 2023 meta-analysis revealed these events occur in up to 17% of ED intubations, with higher rates (41–45%) in critical care settings. Cardiopulmonary compromise, such as hypoxia, tachycardia, and hypotension prior to induction and ETI, significantly increases the risk of adverse events. Other contributing factors include right ventricular failure and metabolic acidosis. The mnemonic HARM—hypoxia, apnea, right ventricular failure, and metabolic acidosis—can aid in recalling these factors.

Management strategies include addressing hypotension through treatment of the underlying cause, volume repletion, and norepinephrine for those unresponsive to fluids. Hypoxia, bradypnea, and transient apnea should be mitigated with aggressive preoxygenation and apneic oxygenation (e.g., bag-valve mask ventilation). For metabolic acidosis, intubation should be avoided if respiratory compensation is adequate. If necessary, hyperventilation via bag-valve mask before intubation and minimizing ETI duration are critical. For right ventricular failure, clinicians should optimize hemodynamics, ensure preoxygenation, and prepare for potential hemodynamic instability during induction or post-positive pressure ventilation (Kostura et al., 2022).

Evidence Behind Preoxygenation and Apneic Oxygenation

The peri-intubation phase poses a high risk for hypoxemia. Once oxygen saturation drops to 88–90%, a rapid decline can ensue, risking end-organ injury and cardiac arrest. Preoxygenation extends the safe apnea period (time to desaturation of 88–90%) by administering supplemental oxygen prior to ETI attempts. Methods include nasal cannula with a facemask or bag-valve mask (BVM) with positive end-expiratory pressure (PEEP), high-flow nasal cannula (HFNC), or noninvasive positive pressure ventilation (NIPPV), such as continuous positive airway pressure (CPAP) or bilevel positive airway pressure (BPAP).

The first option involves using a nasal cannula with a non-rebreather mask at >15 L/min or flush rate. HFNC is another option that provides heated, humidified air at high flow rates and greater comfort. The most effective strategy is NIPPV using CPAP or BPAP, particularly for critically ill or obese patients who fail to achieve oxygen saturation >93–95% after 3 minutes or 8 vital capacity breaths. BPAP is particularly beneficial for patients requiring ventilatory support or lung recruitment (Gibbs et al., 2024).

A 2024 randomized controlled trial involving 1301 critically ill patients undergoing ETI compared preoxygenation with noninvasive ventilation for 3 minutes versus facemask preoxygenation. Hypoxemia occurred in 9.1% of the noninvasive ventilation group compared to 18.5% in the facemask group, with no significant difference in aspiration rates (0.9% vs. 1.4%). When NIPPV is used, PEEP should be titrated to 5–15 cm H_2O to maintain oxygen saturation >99%. If a ventilator is unavailable, a nasal cannula with a BVM and PEEP valve at flush rate is an alternative. Importantly, in emergent respiratory failure, oxygen must be administered, and intubation should not be delayed for NIPPV setup to avoid cardiopulmonary compromise.

For optimal preoxygenation, 3 minutes of tidal volume breathing or 8 vital capacity breaths with high oxygen flow is recommended. However, critically ill patients may be unable to perform vital capacity breaths, necessitating mandatory breaths via BPAP or BVM (Gleason et al., 2018).

Following induction and paralysis during rapid sequence intubation (RSI), desaturation can occur quickly due to the absence of gas exchange. While healthy preoxygenated individuals may have a safe apnea time of 8–9 minutes, critically ill patients in ED settings often desaturate within seconds. Risk factors for desaturation include airway occlusion, increased oxygen consumption, shunt physiology, pregnancy, pediatric patients, and inadequate preoxygenation (Gleason et al., 2018).

Apneic oxygenation, in which supplemental oxygen is delivered during the apneic period, helps prolong safe apnea time by enabling alveolar oxygen absorption at 250 mL/min despite the absence of diaphragmatic movement. This involves maintaining the preoxygenation device (e.g., nasal cannula or NIPPV) during induction and the apneic phase. Once ready for ETI, the BVM or NIPPV mask is removed while maintaining nasal cannula oxygen at maximum flow. A jaw thrust can preserve pharyngeal patency during apnea.

A 2023 Cochrane review of 23 randomized controlled trials, including studies conducted in ED, ICU, and operating room settings, found no significant differences in hypoxemia, first-pass success, or adverse events (e.g., arrhythmias, aspiration, cardiac arrest). The Society of Critical Care Medicine (SCCM) 2023 Clinical Practice Guidelines do not routinely recommend apneic oxygenation, except for challenging laryngoscopy or severe hypoxemia. However, the European Society for Emergency Medicine advises its use whenever possible to extend safe apnea time. Considering many trials excluded severely hypoxemic patients, apneic oxygenation should be prioritized in ED settings for those with limited preoxygenation ability, critical illness, persistent hypoxemia, or anticipated difficult airways with prolonged ETI attempts.

Which induction medication should be used?

Induction medications play a critical role in sedating patients and optimizing the likelihood of first-pass success during intubation. Various options are available, including propofol, etomidate, and ketamine. Propofol, an intravenous (IV) agent that primarily acts through GABA receptors, is commonly utilized for intubation in patients with status epilepticus, hypertensive emergencies, intracranial emergencies (e.g., subarachnoid or intracranial hemorrhage), or severe alcohol withdrawal syndrome. It is administered at a dose of 0.5–1.0 mg/kg IV over 10 seconds, with a rapid onset of action (less than one minute) and a duration of action lasting 2–8 minutes (Folino et al., 2023). However, propofol has a significant risk of causing hypotension and should be avoided or used in lower doses in patients with low blood pressure or those at risk for hypotension.

Etomidate and ketamine, which exhibit more hemodynamically stable properties, are the most frequently employed induction medications. Etomidate is a non-barbiturate hypnotic IV anesthetic that lacks analgesic properties. It is administered at a dose of 0.2–0.3 mg/kg IV, with an onset of action occurring within 30–60 seconds, peak effect at approximately 1 minute, and a duration of action lasting 200–300 seconds. Concerns about adrenal suppression following etomidate administration have been reported. Ketamine, an NMDA antagonist, possesses both sedative and analgesic properties. It is dosed at 1–2 mg/kg IV or 4–5 mg/kg intramuscular (IM), with an onset of action within 30–60 seconds, a peak effect within 1 minute, and a half-life of 2–4 hours.

Several studies have examined ketamine and etomidate, yielding mixed results regarding peri-intubation adverse events. A 2024 meta-analysis encompassing 7 randomized controlled trials (RCTs) and 1 propensity-matched study evaluated critically ill adult patients undergoing emergency intubation. The findings demonstrated no significant difference in mortality between ketamine and etomidate (relative risk [RR] 0.96; 95% credible interval 0.8–1.1), with similar outcomes in Sequential Organ Failure Assessment (SOFA) scores, vasopressor-free days, ventilator-free days, blood pressure, and first-attempt success. However, Bayesian analysis revealed a 68.6% probability that ketamine might reduce mortality by up to 1% compared to etomidate and a 41.6% probability of reducing mortality by ≥1%. Importantly, the Society of Critical Care Medicine (SCCM) 2023 Clinical Practice Guidelines, published before this meta-analysis, suggest no significant differences in mortality, hypotension, or vasopressor use between etomidate and other agents in the peri-intubation period or during hospital discharge. Meanwhile, the European Society for Emergency Medicine acknowledges the hemodynamic neutrality of both ketamine and etomidate, while cautioning against potential adrenal suppression associated with etomidate, leading to a preference for ketamine (Hohenstein et al., 2024).

Based on the available evidence, the choice of induction agent must be individualized. Ketamine and etomidate are both suitable for routine intubation, whereas propofol should be reserved for specific cases such as status epilepticus, severe hypertension, and alcohol withdrawal syndrome.

Which paralytic should you administer?

Paralytic agents are associated with higher rates of first-pass success during intubation. The use of succinylcholine, a depolarizing muscle relaxant, was first reported in the late 1940s. Succinylcholine functions by binding to postsynaptic acetylcholine receptors, leading to continuous stimulation, transient fasciculations, and subsequent paralysis. The typical dose of succinylcholine is 1.0–1.5 mg/kg IV, with an onset of action of 45 seconds and a duration of 4–6 minutes. It can also be administered intramuscularly (IM), with an onset of 2–3 minutes and a duration of 10–30 minutes. Rocuronium, a nondepolarizing agent introduced in the 1990s, competitively antagonizes acetylcholine receptors, resulting in paralysis without causing fasciculations. It is dosed at 0.6–1.2 mg/kg IV, with an onset of 45–120 seconds (depending on the dose) and a duration of action lasting 30–90 minutes (Jain et al., 2024).

A 2017 meta-analysis of 50 studies compared succinylcholine and rocuronium. The results indicated that succinylcholine was superior to low-dose rocuronium (0.6–0.7 mg/kg) in achieving excellent intubating conditions (RR 0.86; 95% CI 0.81–0.92) and clinically acceptable conditions (RR 0.97; 95% CI 0.95–0.99). However, no differences were observed when higher doses of rocuronium (≥0.9 mg/kg IV) were utilized, which is the dosing most commonly employed in the emergency department (ED). A study using the National Emergency Airway Registry (NEAR) found no significant difference between succinylcholine and rocuronium in first-pass success rates (87.0% vs. 87.5%) or adverse events (14.7% vs. 14.8%). The average doses in this study were succinylcholine 1.8 mg/kg IV and rocuronium 1.2 mg/kg IV.

Both succinylcholine and high-dose rocuronium demonstrate similar efficacy in achieving optimal intubating conditions, have comparable onset times, and are effective paralytic agents. The choice between them should consider specific patient factors. Succinylcholine has a shorter duration of 4–6 minutes, enabling neurologic assessment shortly after intubation if needed. Rocuronium, with its longer duration of action, is advantageous if further airway interventions (e.g., cricothyrotomy) become necessary, as the patient remains paralyzed. Rocuronium is also preferred in cases where desaturation risk is high due to its longer safe apnea time or in the presence of hyperkalemia, as succinylcholine can exacerbate hyperkalemia due to potassium release. Additionally, succinylcholine is contraindicated in patients with myasthenia gravis; in such cases, a reduced dose of rocuronium is recommended (Roper et al., 2017).

Some studies have proposed administering the paralytic prior to the sedative, given that sedatives generally have a faster onset than paralytics. However, this practice could result in respiratory cessation without paralysis, leading to pulmonary derecruitment, carbon dioxide retention, and hypoxia. A 2019 study investigating the sequence of rapid sequence intubation (RSI) medications in ED patients found that administering the paralytic before the sedative reduced the time from medication administration to the end of the intubation attempt by 6 seconds (95% CI 0–11 seconds). Nevertheless, this time reduction is not clinically significant, and the risk of paralysis without sedation outweighs any potential benefit. Consequently, this approach should be approached with caution, and further studies are warranted.

Should you use video or direct laryngoscopy?

Endotracheal intubation (ETI) can be performed using two primary techniques: direct laryngoscopy (DL) or video laryngoscopy (VL), with the latter utilizing either a hyperangulated blade or a standard-geometry blade. In DL, the practitioner employs a blade with an integrated light source attached to a handle containing batteries, which is used to displace the tongue, manipulate the epiglottis, visualize the glottic structures directly, and insert the endotracheal tube (ETT) through the vocal cords. In contrast, VL incorporates the same elements as DL but includes a camera in the distal portion of the blade, which transmits images to a monitor, allowing visualization of the ETT passage through the glottic structures without requiring a direct line of sight. The hyperangulated VL blade has a sharper curvature, which precludes direct visualization, whereas the standard geometry VL blade allows for both direct and video-assisted visualization (Prekker et al., 2023).

Although DL remains the most commonly used technique in emergency department (ED) and intensive care unit (ICU) settings globally, the utilization of VL has significantly increased in recent years. A 2024 meta-analysis of randomized controlled trials (RCTs) conducted in the ED and ICU reported that VL improved first-pass success rates (relative risk [RR] 1.12; 95% confidence interval [CI] 1.04–1.20), while also reducing the rates of esophageal intubations (RR 0.44; 95% CI 0.24–0.80) and aspiration (RR 0.63; 95% CI 0.41–0.96). Furthermore, a multicenter RCT published in 2023, which included 1,417 patients undergoing ETI in the ED or ICU, demonstrated that VL increased first-pass attempt success compared to DL (85.1% versus 70.8%, absolute difference 14.3%; 95% CI 9.9%–18.7%). Notably, 70% of these intubations occurred in the ED, and 92% were performed by emergency medicine residents or critical care fellows. The study found no significant differences between VL and DL in terms of complications, including hypotension, hypoxia, vasopressor use, cardiac arrest, death, aspiration, esophageal intubation, or dental injuries. However, the benefit of VL in achieving first-pass success diminished in individuals who had performed at least 100 prior intubations, with DL being preferred by those with over 250 previous intubations. Based on this evidence, it is recommended that novice intubators (fewer than 100 ETIs) use VL, while experienced clinicians may opt for either DL or VL. Regardless of the device used, it is critical to have a well-defined backup plan in place in case initial attempts are unsuccessful.

When should a bougie be used?

A bougie, also known as the Eschmann tracheal tube introducer, is a flexible 60-cm device with a coudé tip angled at 35–40 degrees at its distal end. Bougies are available in sizes ranging from 10 to 15 French. Historically, the bougie was primarily reserved for cases where an initial intubation attempt had failed, but more recent studies have examined its utility during the first ETI attempt. The BEAM randomized controlled trial, published in 2018, compared the use of a bougie to an ETT with stylet for the first intubation attempt in 757 patients. The study found higher first-attempt success rates with the bougie (98% versus 87%), with no significant differences in the duration of the attempt or the incidence of hypoxia. However, this trial was conducted at a center with significant prior experience using bougies. Another trial, published in 2021 and involving 1,102 patients, found no significant difference in first-attempt success rates between the bougie (80.4%) and the stylet (83.0%) (Driver et al., 2021).

A 2024 meta-analysis including 18 studies reported that the bougie improved first-attempt success overall (RR 1.11; 95% CI 1.06–1.17) and across various subgroups, with the greatest benefit observed in patients with Cormack-Lehane grade III or IV airways (RR 1.60; 95% CI 1.40–1.84). The bougie offers several advantages, including improved visualization of its passage through the vocal cords, which decreases the likelihood of esophageal intubation. Additionally, the tactile sensation of tracheal rings or resistance at the carina can confirm correct placement within the trachea. Bougies can also facilitate the advancement of an ETT into a single mainstem bronchus when one-lung ventilation is required. Based on the current evidence, the bougie likely enhances first-attempt success for clinicians experienced in its use, and it is recommended as a first-line tool when performing ETI.

What is the role of ultrasound for confirming ETT placement?

Verification of ETT placement is a critical step following ETI. Various techniques are available for confirmation, including observation of chest rise, auscultation of breath sounds, visualization of ETT condensation, direct visualization, and capnometry (either quantitative or qualitative). While capnography is widely used, it has certain limitations, such as false positives in cases of hypopharyngeal placement or recent ingestion of carbonated beverages, as well as false negatives in situations with low expired CO_2 levels (e.g., cardiac arrest, flash pulmonary edema, massive pulmonary embolism)(Eichlseder et al., 2023; Gottlieb et al., 2024).

Point-of-care ultrasound (POCUS) is a rapid and reliable adjunct for confirming ETT placement within the trachea and assessing for mainstem intubation. A large meta-analysis reported that POCUS has a sensitivity of 99% and a specificity of 97% for confirming ETT placement. To perform this procedure, a linear ultrasound probe is positioned transversely on the anterior neck at the level of the suprasternal notch. This assessment can be conducted using either a static or dynamic technique. The static technique involves assessing for a single air-mucosal interface with posterior shadowing (the "bullet" sign), which indicates proper tracheal placement of the ETT. Manipulating the ETT by twisting it may enhance visualization. If the esophagus is intubated, a "double tract" sign, representing a second air column, will be visible. In the dynamic technique, a second operator evaluates for motion artifacts behind the trachea during ETT insertion to confirm tracheal placement or the presence of the double tract sign to confirm esophageal placement.

If the transtracheal approach yields ambiguous results, clinicians can further evaluate by inspecting for bilateral lung sliding using POCUS. Once placement is confirmed, the probe can be rotated 90 degrees clockwise to visualize the ETT cuff's position relative to the cricoid and tracheal rings, allowing for confirmation of ETT depth. Based on the available evidence, POCUS should be considered an adjunctive tool for confirming ETT placement, particularly in situations where capnography may produce false negatives (e.g., cardiac arrest, massive pulmonary embolism).

What is the importance of post-intubation sedation?

Regardless of the paralytic agent used, ensuring adequate sedation and analgesia immediately after intubation is crucial to prevent post-intubation awareness during paralysis. Awareness with recall of paralysis (AWP) is associated with severe long-term psychological consequences, including post-traumatic stress disorder (PTSD), depression, and phobias (Pandit et al., 2014).

Recent studies have investigated the prevalence of AWP in the ED setting. A single-center observational study of 383 mechanically ventilated ED patients reported an AWP prevalence of 2.6%, with rocuronium use associated with a higher risk of AWP (unadjusted odds ratio 5.1; 95% CI 1.30–20.1). Patients experiencing AWP exhibited higher threat perception scores (13.4 versus 8.5; mean difference 4.9; 95% CI 0.94–8), a known risk factor for PTSD. Another study, published in 2023, included 866 mechanically ventilated ED patients, finding that 7.4% (66 patients) possibly or definitely experienced AWP. However, this study found no significant association between specific paralytics or sedatives and AWP. A 2022 study involving 388 mechanically ventilated ED patients reported an AWP prevalence of 3.4%, with most cases (12/13, 92.3%) involving rocuronium. These patients also had higher threat perception scores.

Given the current literature, a notable proportion of patients experience AWP. Clinicians must ensure adequate post-intubation sedation to enhance patient comfort, improve ventilator synchrony, and reduce respiratory effort. Sedative agents for post-intubation care should be prepared and available in the patient's room at the time of induction and administered immediately after ETI.

The Role of Doctors in Endotracheal Intubation in the Emergency Room

Doctors play a central role in performing endotracheal intubation (ETI) in the emergency room (ER), as this procedure is critical for managing patients with compromised airways. Physicians assess the need for intubation based on the patient's clinical presentation, such as respiratory failure, inability to protect the airway, or severe hypoxemia. They are responsible for selecting the appropriate method of intubation, such as direct or video laryngoscopy, and choosing suitable pharmacological agents, including sedatives and paralytics, to ensure optimal conditions for ETI while minimizing adverse events.

Doctors also lead the airway management team, coordinating with anesthesiologists, nurses, and respiratory therapists to prepare necessary equipment, such as endotracheal tubes, bougies, and ultrasound devices for confirming ETT placement. They employ clinical tools like the LEMON assessment to predict a difficult airway and utilize techniques like preoxygenation and apneic oxygenation to prevent hypoxemia during the procedure. Furthermore, physicians ensure that post-intubation care, including adequate sedation and ventilation settings, is initiated promptly to maintain patient stability and prevent awareness during paralysis. Their expertise and decision-making are vital to achieving first-pass success, reducing complications, and ensuring positive outcomes for critically ill patients in the ER.

The Role of Nurses in Endotracheal Intubation in the Emergency Room

Nurses play an essential role in supporting endotracheal intubation (ETI) in the emergency room (ER), ensuring the procedure is carried out efficiently and safely. Their responsibilities include preparing the necessary equipment, such as intubation kits, laryngoscopes, bougies, and suction devices, and verifying that all components are functioning properly. They assist in positioning the patient to optimize airway access, often by aligning the head and neck for better visualization during intubation. Nurses also play a critical role in monitoring the patient’s vital signs, such as oxygen saturation, heart rate, and blood pressure, throughout the procedure, promptly alerting the physician to any signs of deterioration.

In addition, nurses help administer pre-intubation medications, including sedatives and paralytics, under the physician's guidance, ensuring accurate dosing and timely delivery. They assist in preoxygenation efforts, such as applying high-flow nasal cannulas or bag-valve masks with positive end-expiratory pressure (PEEP), to prevent hypoxemia. After intubation, nurses help secure the endotracheal tube, confirm placement using capnography or other adjuncts, and prepare for post-intubation care by administering sedation and analgesia. Their vigilance, technical skills, and coordination with the medical team are integral to the success of ETI and the patient’s overall safety.

The Role of Anesthesiologists in Endotracheal Intubation in the Emergency Room

Anesthesiologists are pivotal in performing and overseeing endotracheal intubation (ETI) in the emergency room (ER), particularly in complex or high-risk cases. Their expertise in airway management equips them to handle difficult airways using advanced techniques such as video laryngoscopy, fiberoptic intubation, or surgical airway interventions when necessary. Anesthesiologists are also proficient in selecting and administering induction agents and paralytics, tailoring medications like ketamine, etomidate, or succinylcholine based on the patient’s physiological status, comorbidities, and potential complications.

In addition to performing ETI, anesthesiologists guide the airway team by ensuring proper equipment is available, including laryngoscopes, endotracheal tubes, and backup devices like bougies or cricothyrotomy kits. They closely monitor the patient’s hemodynamic stability during induction and intubation, promptly addressing adverse events such as hypoxia or hypotension. Post-intubation, anesthesiologists ensure adequate sedation, analgesia, and ventilation settings to maintain patient safety and comfort. Their advanced skills and critical decision-making play an indispensable role in ensuring the success of ETI, especially in challenging scenarios.

The Role of Respiratory Therapists in Endotracheal Intubation in the Emergency Room

Respiratory therapists are integral to the endotracheal intubation (ETI) process in the emergency room (ER), providing expertise in airway management and ventilatory support. They prepare and ensure the functionality of essential respiratory equipment, such as bag-valve masks (BVMs), suction devices, endotracheal tubes, and ventilators. During ETI, respiratory therapists assist in preoxygenating the patient using high-flow nasal cannulas, noninvasive positive pressure ventilation (NIPPV), or BVMs with positive end-expiratory pressure (PEEP) to prevent hypoxemia.

After intubation, respiratory therapists confirm endotracheal tube placement through techniques such as waveform capnography or auscultation and help secure the tube to prevent dislodgement. They are also responsible for setting up and adjusting ventilators to optimize oxygenation and ventilation based on the patient’s condition and clinical parameters. In addition, they monitor the patient’s respiratory status, including oxygen saturation, airway pressures, and ventilation adequacy, and collaborate with the medical team to make necessary adjustments. Their technical skills and close collaboration with physicians and nurses ensure the patient’s respiratory needs are met efficiently and safely during and after intubation.

The Role of X-ray technicians in Endotracheal Intubation in the Emergency Room

X-ray technicians play a crucial role in the process of endotracheal intubation (ETI) in the emergency room (ER), primarily by providing imaging support to confirm tube placement and assess potential complications. Once the intubation procedure is complete, technicians perform chest radiographs to verify that the endotracheal tube is positioned correctly, typically 2-4 cm above the carina, within the trachea. This imaging is vital to ensure the tube is not placed too deeply into a mainstem bronchus or inadvertently in the esophagus, which could lead to ineffective ventilation or hypoxia. X-ray technicians also aid in identifying complications such as pneumothorax or subcutaneous emphysema that may arise during or after the procedure. Their expertise in operating imaging equipment and producing high-quality diagnostic images is indispensable for the medical team to make timely and accurate adjustments, ensuring patient safety and optimal airway management.

Conclusion

Endotracheal intubation (ETI) is a critical intervention in the emergency room, often performed under high-pressure circumstances with the potential for significant patient complications. This paper highlights the multidisciplinary collaboration required to achieve successful intubation, with each team member contributing unique expertise and skills. Physicians provide leadership and technical expertise in performing ETI, while anesthesiologists bring advanced airway management strategies. Nurses ensure seamless procedural support and vigilant patient monitoring, respiratory therapists optimize preoxygenation and post-intubation ventilatory support, and X-ray technicians confirm tube placement and identify complications through imaging. Together, these roles underscore the importance of teamwork and precision in managing the airway of critically ill patients. By leveraging advancements in technology and adhering to evidence-based practices, the healthcare team can maximize first-pass success rates, minimize adverse events, and improve patient outcomes in emergency settings.

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