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# Paramedic Airway Management Study Guide

2025–2026 Edition – AHA ACLS / NREMT-Aligned

This guide focuses on the core airway concepts most tested on the NREMT Paramedic cognitive and psychomotor exams, as well as day-to-day critical care and 911 practice. It emphasizes the decision-making hierarchy, confirmation techniques, pitfalls, and 2025 AHA updates that change how we teach and perform airway management.

> ***Core Principle (2025 Mantra):***
> *Oxygenation and ventilation are the foundation of every resuscitation and peri-arrest situation. The right airway at the wrong time is worse than the wrong airway at the right time. Choose the airway intervention that gives the highest probability of success with the lowest risk of interruption in the first 60–90 seconds.*



## Section 1: Decision-Making Hierarchy – "Which Airway When?"

| Clinical Situation | First-Line Choice | Backup / Escalation | Key 2025 Judgment Notes |
|---|---|---|---|
| **Cardiac arrest** (initial 4–6 min) | BVM + OPA/NPA (two-person technique) | Supraglottic airway (i-gel, King LT, LMA) if BVM inadequate | 2025 AHA: Supraglottic preferred over ETT early in arrest if BVM is difficult. Continuous compressions possible once SGA placed. |
| **Difficult BVM** (poor seal, high pressure needed) | Immediate supraglottic airway | Endotracheal intubation (video laryngoscopy preferred) | Do NOT persist with failing BVM >2–3 attempts → hypoxia kills faster than a brief SGA attempt. |
| **Failed supraglottic** ×2 attempts | Video laryngoscopy ETT | Surgical cricothyrotomy (if trained / protocol) | "Can't intubate, can't oxygenate" = surgical airway. Have kit ready before second SGA failure. |
| **Anticipated difficult airway** (trauma, obesity, short neck, small mouth) | Awake / ketamine-only intubation or primary surgical airway | Video laryngoscopy + bougie / hyperangulated blade | Plan A = best shot first. RSI in predicted difficult airway can become "crash difficult." Consider ketamine dissociation without paralytic first. |
| **ROSC patient** (post-arrest) | Endotracheal intubation (continuous waveform capnography mandatory) | Supraglottic if intubation fails rapidly | Post-ROSC hypoxia/hypercarbia worsens neurologic outcome. Secure definitive airway early. |

## Section 2: Key Devices & Confirmation Mastery

| Device / Technique | Best Use Case | Confirmation Gold Standard | Most Common Deadly Mistake |
|---|---|---|---|
| **BVM Ventilation** | Initial arrest, apneic overdose, respiratory failure | Visible chest rise + capnography waveform if advanced airway | Over-ventilation (hyperventilation → ↓ venous return, ↓ coronary perfusion) |
| **Supraglottic Airways** (i-gel, King LT, LMA Supreme) | Arrest, failed BVM, bridge to ETT | Continuous waveform capnography + bilateral breath sounds | Assuming placement without waveform → esophageal placement still possible |

| | | | |
|---|---|---|---|
| **Endotracheal Intubation** | Definitive airway, prolonged transport, post-ROSC | Continuous waveform capnography (most important) + bilateral breath sounds + chest rise | Relying on misting / colorimetry alone → false positives common |
| **Surgical Cricothyrotomy** | "Can't intubate, can't oxygenate" | Capnography + bilateral breath sounds | Delaying too long → hypoxia before procedure starts |
| **Waveform Capnography** | Every advanced airway, every arrest | Sustained waveform >10–15 mmHg + consistent shape | No waveform after ETT/SGA = esophageal until proven otherwise |

**2025 AHA Capnography Emphasis:**

- $EtCO_2$ <10 mmHg during CPR → poor-quality CPR or very low chance of ROSC
- Sudden rise in $EtCO_2$ → likely ROSC
- Flat or absent waveform after advanced airway → esophageal placement until proven otherwise

## The "5-Point Check" for Tube Confirmation

| # | Method | Notes |
|---|---|---|
| 1 | **Continuous waveform capnography (ETCO2)** | GOLD STANDARD. Must see consistent waveform for 6+ breaths. Flat line = esophageal. |
| 2 | Direct visualization of tube through cords | Best done during intubation attempt |
| 3 | Bilateral breath sounds (auscultation) | Midaxillary line – equal and clear |
| 4 | Absent epigastric sounds | Gurgling = esophageal |
| 5 | Chest rise & SpO2 improvement | Secondary confirmation only |

**NREMT Critical Fail:** Failure to confirm tube placement with ETCO2 or failure to recognize and correct esophageal intubation immediately.

## Section 3: Oxygen Delivery & Titration Mastery (2025 Updates)

| Device | $FiO_2$ Range | Best Clinical Use | 2025 Titration Goal |
|---|---|---|---|
| **Nasal Cannula** | 24–44% | Mild hypoxia, comfortable conscious patient | $SpO_2$ 94–98% (avoid hyperoxia post-ROSC) |
| **Non-Rebreather Mask** | 60–90% | Severe hypoxia, pre-oxygenation | $SpO_2$ 94–98% |
| **BVM with reservoir** | Near 100% | Apnea, inadequate breathing | Visible chest rise only – avoid gastric insufflation |
| **CPAP / BiPAP** | 30–100% (depending on settings) | Cardiogenic pulmonary edema, COPD exacerbation | Titrate to $SpO_2$ 94–98%, patient comfort |

**Post-ROSC Oxygenation (2025 AHA):** Titrate to $SpO_2$ 94–98%. Avoid hyperoxia ($PaO_2$ >300 mmHg associated with worse neurologic outcome).

## Section 4: Capnography Interpretation

| Waveform Pattern | ETCO2 Value | Interpretation | Action |
|---|---|---|---|
| Normal square wave | 35–45 mmHg | Proper ventilation | Continue current management |
| Flat line (no waveform) | 0 | Esophageal/displaced tube OR cardiac arrest | Verify placement immediately |
| Decreasing ETCO2 | <20 mmHg | Decreased perfusion (arrest quality), hyperventilation, or PE | Check CPR quality, slow ventilation rate |
| Rising ETCO2 | >50 mmHg | ROSC, hypoventilation, or MH | If ROSC, prepare for post-arrest care |
| Shark fin pattern | Variable | Bronchospasm/COPD | Bronchodilators, slow exhalation |
| Curare cleft (notch) | Variable | Patient breathing over vent OR paralytic wearing off | Assess sedation/paralysis needs |

**ROSC Indicator:** Sudden sustained rise in ETCO2 >40 mmHg during CPR = likely ROSC. Check pulse!

## Section 5: Quick Reference – "Can't Intubate, Can't Oxygenate" Checklist

### ⚠ CICO EMERGENCY PROTOCOL

1. **Maximize BVM** (two-person, OPA/NPA, ramping position, nasal trumpet)
2. **Place supraglottic airway** (i-gel or King LT preferred)
3. If still no oxygenation → **declare "Can't intubate, can't oxygenate"**
4. **Go directly to surgical cricothyrotomy** (scalpel-bougie-tube or Seldinger technique)
5. **Never return to face mask or supraglottic** once cric is performed

## Section 6: Rapid Sequence Intubation (RSI)

**The 7 P's of RSI:**
**P**reparation – equipment, meds, backup plan
**P**reoxygenation – 3 min high-flow O2, apneic oxygenation (NC 15 LPM during attempt)
**P**retreatment – Consider lidocaine (ICP), fentanyl (sympathetic response)
**P**aralysis with induction – Induction agent + paralytic simultaneously

**P**rotection – Sellick's (controversial), positioning
**P**lacement – Intubation attempt, confirm with ETCO2
**P**ost-intubation management – Sedation, vent settings, reassess

## Common RSI Medications

| Drug | Class | Dose | Onset | Duration | Key Points |
|---|---|---|---|---|---|
| **Etomidate** | Induction | 0.3 mg/kg IV | 30–60 sec | 3–5 min | Hemodynamically neutral, adrenal suppression (single dose OK) |
| **Ketamine** | Induction | 1–2 mg/kg IV | 30–60 sec | 10–15 min | Maintains BP & respirations, bronchodilator, safe in trauma/sepsis |
| **Succinylcholine** | Paralytic (depolarizing) | 1–1.5 mg/kg IV | 45–60 sec | 6–10 min | Fastest onset, contraindicated in hyperkalemia, burns >24h, crush injury |
| **Rocuronium** | Paralytic (non-depolarizing) | 1–1.2 mg/kg IV | 60–90 sec | 45–60 min | No hyperkalemia risk, reversible with sugammadex |

## Section 7: Special Populations & Situations

### Pediatric Airway Pearls

- **Anatomy:** Larger tongue, anterior/cephalad larynx, narrowest at cricoid (uncuffed tubes <8 years historically, now cuffed OK with monitoring)
- **Tube size formula:** (Age/4) + 4 (uncuffed) or (Age/4) + 3.5 (cuffed)
- **Blade:** Miller (straight) preferred in infants for epiglottis lift
- **BVM rate:** 20–30/min (infant), 15–20/min (child)

### Trauma Airway Considerations

- **C-spine:** Manual in-line stabilization (MILS), no movement during intubation
- **Facial trauma:** Avoid nasal airways, may need surgical airway
- **Burns/inhalation:** Early intubation before swelling, larger tube if possible

### Obese Patient Considerations

- **Positioning:** Ramped position (ear to sternal notch alignment)
- **Preoxygenation:** Extended time, CPAP/BiPAP if available
- **Dosing:** Induction agents by ideal body weight, succinylcholine by actual weight

## Section 8: Troubleshooting & Pitfalls

**Common NREMT Errors:**

- Hyperventilating the patient (>12 breaths/min in arrest)
- Not using ETCO2 to confirm placement
- Ignoring apneic oxygenation during intubation attempts
- Forcing multiple intubation attempts without reoxygenating
- Not having backup airway ready

### The "DOPE" Mnemonic for Sudden Desaturation

**D**isplacement – Tube moved (check depth, ETCO2)
**O**bstruction – Kinked tube, secretions, biting (suction, bite block)
**P**neumothorax – Tension pneumo (needle decompression)
**E**quipment – O2 disconnected, vent malfunction (check connections, bag manually)

## Section 9: High-Yield NREMT / Street Judgment Questions

**1. You place an i-gel after failed BVM ×2. No waveform capnography appears. What is the most likely diagnosis?**

→ **Esophageal placement until proven otherwise.** Remove device, resume BVM, prepare for ETT or cric.

**2. During cardiac arrest, $EtCO_2$ is consistently 4–6 mmHg despite excellent CPR. What is the most likely explanation?**

→ **Very low likelihood of meaningful ROSC.** Consider reversible causes (Hs & Ts), but prepare family / crew for poor prognosis.

**3. 68 y/o female, obtunded, snoring respirations, $SpO_2$ 82% on RA. Jaw thrust + OPA improves $SpO_2$ to 94%. Two minutes later $SpO_2$ drops to 85%. What is happening?**

→ **Likely tongue obstruction again or gastric distension.** Remove OPA, reapply jaw thrust, consider two-person BVM or supraglottic airway.

**4. You intubate a trauma patient. Waveform capnography shows a shark-fin pattern. What does this indicate?**

→ **Bronchospasm** / **airway obstruction** (asthma, COPD exacerbation, aspiration). Treat underlying cause (albuterol, ketamine, magnesium) while ventilating carefully.

**5. Post-ROSC patient has $SpO_2$ of 100% on NRB. What should you do?**

→ **Titrate down to $SpO_2$ 94–98%.** Hyperoxia post-ROSC is associated with worse neurologic outcomes (2025 AHA).

## Quick Reference: Normal Values

| Parameter | Normal Adult | Notes |
|---|---|---|
| ETCO2 | 35–45 mmHg | <20 = poor perfusion or hyperventilation |
| SpO2 | 94–99% | Target 94%+ (92–96% in COPD) |
| Respiratory Rate | 12–20/min | 10–12/min during arrest ventilation |
| Tidal Volume | 6–7 mL/kg | Visible chest rise, avoid overinflation |
| ETT Depth | 21–23 cm at teeth | Confirm with ETCO2 and bilateral breath sounds |