VANDERBILT UNIVERSITY
MEDICAL CENTER

# Surgical Intensive Care Unit

## Practice Management Guidelines: Rapid Sequence Intubation

**I. Purpose:**

Rapid sequence intubation (RSI) involves sequential administration of induction agent followed by neuromuscular blockade to facilitate endotracheal intubation and is necessary in critically ill patients with increased aspiration risk (e.g., bowel obstruction, recent oral intake, GERD). Pre-oxygenation and hemodynamic optimization should precede drug administration to reduce intubation morbidity and mortality.

Intubation should be considered for patients with the following conditions:

- Unable to maintain a patent airway
- Decreased level of consciousness (GCS <8, non-purposeful)
- Hypoxia/hypoxemia (PaO2/FiO2 ratio <250)
- Respiratory rate <10 or >30
- Respiratory acidosis

**II. Equipment:**

1. Continuous monitoring: ECG, blood pressure, pulse oximetry
2. IV access (ideally 2 functioning peripheral IV's or a central line)
3. Pre-oxygenation device (bag-valve-mask, non-rebreather mask, BiPap, high-flow nasal cannula)
4. Bag-valve-mask connected to oxygen delivery system
5. Suction with attached Yankauer tip
6. SICU Airway Bag
   - Laryngoscope (Macintosh and Miller blades)
   - Endotracheal tube with stylet (ETT size ranges from 6.0*** to 8.5***)
   - Bougie
   - 10cc syringe
   - CO2 detector
   - Airway adjuncts (oral airway, nasopharyngeal airway)
   - LMA (laryngeal mask airway)
   - Scalpel + 6.0 ETT for emergent cricothyrotomy
7. McGrath or other video laryngoscope
8. Medications for intubation
9. Code Cart (contains ACLS medications)

## III. Medications

- Sedative (always administer before paralytic):
    - Etomidate 0.2mg/kg, usually 20mg (less if hypovolemic). Onset 60 seconds; duration 3-5 minutes
    - Propofol 1-2mg/kg (less if hypovolemic). Onset ~30 seconds; duration 3-10 minutes
    - Ketamine 1-2mg/kg, usually 100mg. Onset 20 seconds; duration 5-10 minutes
- Adjunctive Agents
    - Midazolam 0.01-0.03mg/kg, usually 1-3mg. Onset 1-5 minutes; duration is dose-dependent. Usually has minimal hemodynamic effects and is excellent for preventing recall
    - Fentanyl 1-2mcg/kg, usually 50-200mcg. Onset almost immediate; duration ~1 hour. May cause hypotension and bradycardia
- Paralytics
    - Succinylcholine 1.5mg/kg, usually 100mg. Onset 20-50 seconds; duration 4-6 minutes.
        - Absolute contraindications: hyperkalemia, myopathy, burn, spinal cord injury, pseudocholinesterase deficiency, open globe injury, and malignant hyperthermia
        - Relative contraindications: prolonged bedrest, renal failure, increased intracranial pressure
    - Rocuronium 1mg/kg. Onset 1-2 minutes; duration 30 minutes
        - For unanticipated difficult airway and subsequent "cannot intubate/cannot ventilate" scenario, consider rapid reversal with sugammadex 16mg/kg (available with anesthesia airway team supplies or through pharmacy)
    - Other non-depolarizing neuromuscular blocking agents: vecuronium (0.1mg/kg) and cisatracurium (0.2mg/kg); however these medications have longer onset of action and should be considered second-line
- Push-Dose Vasopressors
    - Phenylephrine given in 100mcg doses (1mL). May cause reflex bradycardia
    - Ephedrine given in 5-10mg doses. May be beneficial in patients with concomitant hypotension and bradycardia
    - Epinephrine given in 10-20mcg doses (1-2mL's of 1:100,000 "baby epi").

## IV. Preparation

1. Ensure consent is obtained by physician unless intubation is deemed emergent
2. SICU attending must be notified of intubation and should be present for intubation. Patient condition may dictate intubation proceed without attending present; patient safety should be the first priority.
3. If SICU attending unavailable to supervise procedure, call the Anesthesia Airway phone or the Trauma Attending phone:
    a. SICU Attending: 615-886-0669
    b. Anesthesia Airway Team: 615-887-7369
    c. Trauma Attending: 615-480-1149
4. Perform a time out using the separate intubation checklist once everyone involved in the procedure is at bedside

5. Identify medication nurse
6. Identify proceduralist
7. Verify a functioning IV
    a. Blood pressure cuff should not be on the same extremity as the IV that is being used for medication administration
8. Verify medications between intubating provider and medication nurse; ensure availability of extra medications if needed
9. Verify functioning oxygen saturation probe and have a backup available; utilize QRS volume 2 or greater on monitor
    a. Blood pressure cuff should not be on the same extremity as the oxygen saturation probe

**V. Procedure**

1. Wash hands and don personal protective equipment
2. Setup suction apparatus and connect rigid tip catheter to tubing
3. Check equipment
    a. Use syringe to inflate cuff on ETT and assess for leaks; completely deflate the cuff afterwards
    b. Insert the stylet into the endotracheal tube ensuring the tip of the stylet does not extend past the end of the endotracheal tube
4. Check the mouth for dentures and remove if present
5. Begin preoxygenation for 3-5 minutes via bag-valve-mask attached to 100% oxygen, 100% non-rebreather mask, BiPAP with FiO2 100%, and/or high-flow nasal cannula with FiO2 100%
    a. Consider insertion of nasopharyngeal airway or oropharyngeal airway if patient tolerates
6. Position the patient's head by flexing the neck forward and extending the head (sniffing position)
    a. Consider ramping
    b. If cervical spine injury is confirmed or suspected, in-line cervical spinal immobilization must be maintained during the entire procedure and these positioning techniques are contra-indicated
7. Administer medications
    a. Practitioner may identify someone to push medications, but best practice is to have whoever drew up or received medications to administer them
    b. Medications should be labeled with name and concentration
8. Perform external laryngeal manipulation or apply cricoid pressure as indicated
9. After endotracheal tube is placed, inflate cuff with 5-10cc's of air
10. Confirm endotracheal tube placement while manually bagging with 100% oxygen
    a. Attached disposable CO2 detector and watch for color change to indicate the presence of CO2 (yellow = "yes" for 3 consecutive breaths)
    b. Auscultate over the epigastrium and bilateral lung fields in at least two positions
        i. If breath sounds are absent on the left side, deflate the cuff and withdraw the tube 1-2cm. Re-evaluate for bilateral breath sounds indicating correct tube placement

c. Observe for symmetric chest wall movement
d. Evaluate oxygen saturation (SpO2) by pulse oximetry
e. If methods of confirmation reveal that the tube has not been correctly placed, deflate the cuff and remove the tube immediately and begin to pre-oxygenate with bag-valve-mask attached to 100% oxygen, as patient will likely still be paralyzed
f. If there is a second failed attempt, begin difficulty airway algorithm and call for assistance

11. Connect endotracheal tube to ventilator
12. Secure the endotracheal tube and reconfirm position; note the position of the tube in centimeters at the teeth
13. Order a chest x-ray to evaluate tube position

**VI. Revised September 1, 2021:**

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**VII. Endorsement:**

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